FLIGHT
and
AIRCRAFT ENGINEER

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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams : Flightpress, Sedist, London. Telephone : Waterloo 3333 (50 lines.)

COVENTRY: 8-10, CORPORATION ST. Telegrams : Autocar, Coventry. Telephone : Coventry 5210.
BIRMINGHAM, 2: KING EDWARD HOUSE, NEW STREET. Telegrams : Autopress, Birmingham. Telephone : Midland 7191 (7 lines).
MANCHESTER, 3 : 260, DEANSGATE. Telegrams : Iliffe, Manchester. Telephone : Blackfriars 4412.
GLASGOW, C.2 : 26B, RENFIELD ST. Telegrams : Iliffe, Glasgow. Telephone : Central 4857

SUBSCRIPTION RATES : Home and Abroad ; Year, £3 1 0. 6 months, £1 10 6.

Registered at the G.P.O. as a Newspaper

No. 2002. Vol. LI. May 8th, 1947 Thursdays, One Shilling.

The Outlook

Two More Records

BRITISH aviation prestige rose again last week when two very dissimilar aircraft types of the Royal Air Force, manned by R.A.F. personnel, set up new records between England and Capetown : a de Havilland Mosquito photographic reconnaissance machine and an Avro Lincoln heavy bomber, both driven by Rolls-Royce Merlin engines.

From the military aspect, it might be argued, these records have demonstrated nothing which was not already known. It is, of course, true that the capacities of these two aircraft types had already been amply proved in service, but the fact should not be overlooked that, with independence granted to India and Burma, difficulties in Egypt (where Service personnel now have to change into "civvies" when crossing the boundary of the Canal Zone!), troubles in Palestine, and national aspirations in Ceylon, the picture of Empire defence has changed very considerably. Service aircraft of high speed and long range have become more necessary than ever if we are to be able to link up such bases as we already have, or any that may be established in the future. Their defence will entail all three elements: land, sea and air.

The two recent flights have demonstrated that parts of the Empire more than 6,000 miles apart can be reached in approximately two complete circuits by the hour hand of a clock—in the one case a little under and in the other a little over. That, it appears to us, is the real significance of the two flights from the military point of view. In any future disturbance the time factor may be vital, hence speed enters into the equation. The distance between future possible bases of Empire defence is governed by the range of available aircraft, and the Mosquito and Lincoln have proved that theirs would suffice in many cases.

Turning to the personal side, speed has also proved valuable in reducing fatigue. In the case of the Mosquito, the crew of two were tired and stiff from their somewhat cramped quarters; but their fatigue is in no way comparable with that suffered by those who blazed the trail to South Africa in smaller and much slower aircraft, particularly so in the solo flights, in which the limit was set by human endurance rather than by mechanical limitations. In the *Aries II* there was, of course, a crew of normal size—and room to do a little leg-stretching when this became desirable, so that this flight can be said to have been made in comparative comfort. Technical progress has been such that there is no longer any need to overstress the human factor in order to achieve the desired goal.

Time for Segregation?

RECENT events have tended to revive thoughts of specialized types of aircraft for carrying mails. In our issue of April 24th "Kibitzer" expressed surprise that no one appears to have given much thought to this subject. In this issue a Dutch correspondent reminds us that such a machine was actually designed and built in Holland before the war.

The decision of the Government not to purchase any more American aircraft for the British operators has caused B.O.A.C. to get busy on planning routes and schedules for operating flying-boats on Empire services. Last week we commented on—and welcomed—the fact that the corporation will now be compelled to use the somewhat slower but very comfortable flying-boats to a greater extent than hitherto, and we expressed the view that it is of no real importance if a passenger has to spend two or three days extra in reaching Australia.

In the case of mails, however, there is everything to be said for high speed, and it may well be that we shall now have to re-examine the question of segregating mails and passengers. In any case, *Flight* has always held

that it is illogical to fly the two in the same aircraft. In the early days of air transport there was something to be said for this practice, but in modern times there are many arguments against it. For example, many will remember the trouble and discontent caused around Christmas time because of the conflicting demands on priority of passengers and mails. If mails are given that priority, passengers are disappointed, and the other way around hundreds of recipients are kept waiting for their Christmas greetings.

In the design of the aircraft themselves, the requirements of the two are totally different. Passengers require a lot of space for every pound of weight; mails very little. Passengers must be given a degree of comfort which runs away with a great deal of payload. Mails can be carried in comparatively small containers which, even if some extra ones have to be mounted externally in the form of panniers, do not detract very seriously from the performance of the aircraft. This fact might be utilized on an air mail run by dropping the panniers by parachute at intermediate stages on some routes, thus saving the time taken up by landings. In America the flying pick-up system has proved practical, and there is no reason why we should not employ it on our Empire routes.

It would probably take too long to produce special mailplanes, since the object should be to get such air mails going as soon as possible, but it is conceivable that a machine like the Mosquito, for instance, could be turned into a very useful mail-carrier. There are plenty of them, and the R.A.F. should be well able to spare a certain number.

The cost of such a high-speed air mail service might be comparatively high, but those business firms which really found it worth while would probably not grudge a fairly substantial surcharge.

CONTENTS

Outlook	407
Two London-Capetown Records	409
Servicing and Maintenance	410
Congo Bound—Part II	412
Italian Transports	415
Here and There	416
Blind Approach Presentation	418
Britain's Test Pilots	a
Dim Types	422
Private Enterprise	424
Civil Aviation	425
Correspondence	429
Service Aviation	430

Dropping the Payload

BRITISH EUROPEAN AIRWAYS have not been slow in acting upon the conclusions reached by the Air Safety Board in connection with the all-up weight of the Dakota. That conclusion, it may be remembered, was that all-up weight by itself is less important than the adjustment of the take-off weight to suit the conditions of the airports.

In future all B.O.A.C. aircraft will have their weight reduced, where necessary, to ensure safety in case of engine failure at take-off, and continuation of flight over the highest point on the route.

Elsewhere in this issue will be found further details, from which it will be seen that the corporation is sacrificing a good deal of payload in order to enable certain airports to continue to be used. With a financial deficit already looming on the horizon, this step cannot have been an easy one to take, but the corporation has undoubtedly done the right thing.

ALL SET FOR A DAY'S OUTING: The Transport Command Mosquito at London Airport, Heathrow, before starting on its record-breaking 21½-hr. flight to Capetown. The pilot, S/L. H. B. Martin (right), and S/L. E. B. Sismore, the navigator, are standing in front of the aircraft.

TWO LONDON-CAPETOWN RECORDS

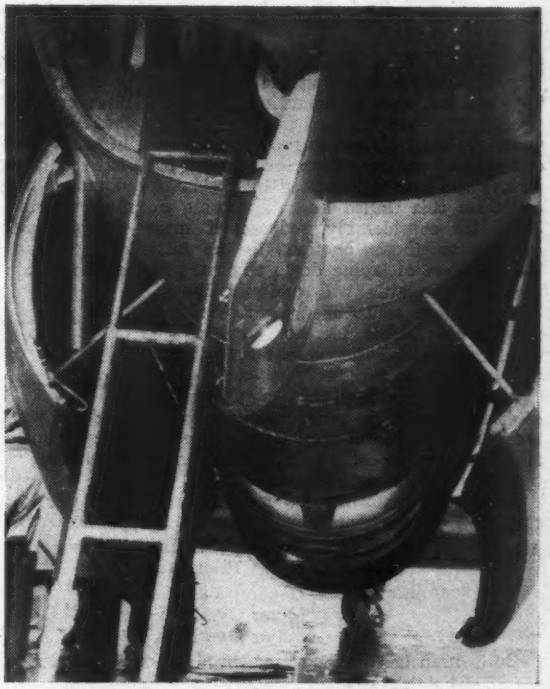
Quarter Circuit of the World in a Day

AT 5.35 p.m. D.B.S.T. on May 1st a standard de Havilland Mosquito P/R Mk. 34 touched down at Brooklyn Airport, Capetown, completing an officially timed flight of 6,717 miles in 21 hr 31 min, thus lowering by 10 hr 50 min the unofficial record set up by the R.A.F. Lancaster *Aries I* in January, 1946. Average speed of the Mosquito was 310 m.p.h., including the time on the ground. The official record which the Mosquito set out to beat was that made by F/O. A. E. Clouston and Mrs. Kirby Green in a de Havilland Comet, whose time was 45 hr 6 min, in 1937. The Mosquito broke this record by 23 hr 36 min.

Piloted by Australian S/L. Harold Brownlow Martin, triple D.S.O. and D.F.C., and his navigator, S/L. Edward Sismore, D.S.O., D.F.C., and two bars, the aircraft took off from London Airport at 8.4 p.m. on April 30th. Only two stops were made for fuel, at El Adem and Kisumu. The splendid co-operation of the ground crews at El Adem must be recognized in replenishing the 1,267-gall. fuel load in under twenty minutes. At Kisumu, in Kenya, the Mosquito was only on the landing ground for twenty-five minutes. On landing at Brooklyn, S/L. Martin said, "Nothing to report. It was a flight without incident."

The de Havilland Mosquito P/R Mk. 34 is fitted with two Rolls-Royce Merlin 113/114 engines developing 1,430 h.p. at 27,250ft, with a maximum speed of 422 m.p.h. at 30,000ft. Brigadier J. J. Durrant, Director-General of the South African Air Force, sent a message to S/L. Martin on the Mosquito's arrival at Capetown, saying, "Heartiest congratulations. Very fast flight and most excellent performance."

The record-breaking Mosquito was to take part in the air rally held at Johannesburg on Saturday, May 3rd. It will afterwards return to Britain by easy stages.

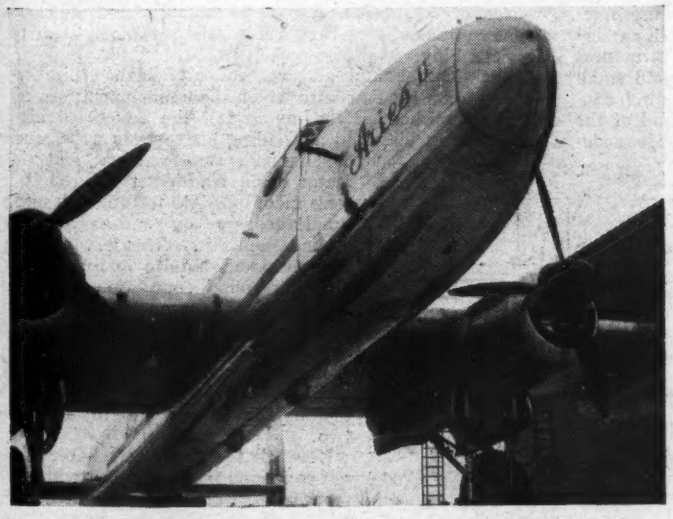


In the bomb bay of the Transport Command Mosquito 869 gallons of fuel were carried in special long-range tanks.

Aries Flies New Route

Aries II, the four-engined Lincoln of the Empire Air Navigation School, left Manston, Kent, at 6.57 p.m. last Wednesday and landed at Capetown at 9.54 p.m. D.B.S.T. the following day, thus easily beating the unofficial record of the *Aries I*. The *Aries* flew a new route for the Cape flight, via Kano, in West Africa. A. Cdre. H. N. D'Aeth, in charge of the navigation demonstration tour of the *Aries*, said, "There were no incidents on the way down, and everything went smoothly."

Comparative fastest times for the England to Cape flight are: 1937, S/L. Clouston and Mrs. Kirby Green—45 hr 6 min (the official two-man record); 1939, Mr. Alex. Henshaw (solo record), 39 hr 35 min; 1945, Lancaster *Aries I* (unofficial record), 32 hr 21 min; 1947 (May 1st), S/L. Martin's Mosquito, 21 hr 31 min.



The Avro Lincoln *Aries II* from the Empire School of Air Navigation which lowered the Cape record of its predecessor by 5 hr 24 m.

Crew's War Record

S/L. Martin is the only survivor of the bomber captains selected and specially trained for the raids on the Möhne and Eder dams on May 16th, 1943. He also took part in other low-level attacks on the Kiel and Dortmund-Ems Canals and later served on intruder work over German airfields in Europe.

S/L. Sismore served with Blenheims attacking continental ports in 1941 and later joined a Mosquito squadron. On his second tour he led the raid on Berlin which stopped Goering's speech to the German people on June 30, 1943.

TIMETABLE

	D.B.S.T
Left London	20.06 hr.
Landed El Adem	01.30 hr.
Took off El Adem	01.50 hr.
Landed Kisumu	08.49 hr.
Took off Kisumu	09.15 hr.
Landed Brooklyn	05.35 hr.

Servicing and Maintenance

Planning for Practical Requirements : Meeting the Needs of High Utilization : The Importance of Comprehensive Manuals

By BASIL JACKSON, A.M.I.Ae.S., A.R.Ae.S.

SERVICING, maintenance, and inspection, are branches of aviation which are vitally necessary for safe and efficient aircraft operation. It might have been expected, in view of this important fact, that designers would do their utmost to provide ample facilities for these duties to be carried out on their products. That this is not always the case is indicated by the large amount of time spent on this skilled and responsible work; time which could be considerably reduced if more thought were devoted to these functions in the initial design stage. The problem of laying down efficient servicing and maintenance standards will undoubtedly become more acute as the size and weight of aircraft increase, and it must be faced at the present time to prepare for the future.

Members of the design staff are often unaware of the practical difficulties encountered when their creations are in service; in consequence major modifications follow in order to meet requirements brought about by actual operational experience.

Taking as an example a medium passenger transport, the main requirements appear simple enough, namely:—

Servicing:—Ground Handling.
Flight Preparation.
Maintenance:—General Maintenance.
Minor Overhaul.
Major Overhaul.

Both branches are covered by inspection regulations specified by the responsible Government authority.

Servicing

Dealing, in the first place, with ground handling, the chief points to be considered are: (1) Towing; (2) Picketing; (3) Locking of flying controls; (4) Fitting weather protection coverings.

(1) and (2) are operations which are quite easily accomplished, most aircraft being provided with adequate towing and picketing points. The only criticism is that too often the handling is done by ground personnel who do not appreciate the fragile construction of the machines concerned and clamber over the stressed skin with clumsy footwear. A brief introduction to the basic structural features of aircraft would go a long way to avoid small mishaps, such as denting panels, slightly buckling control-surface trailing edges, and fouling the tail end of the fuselage with the steering fork or towing bar. The accumulation of minor accidents on the ground may lead to major disasters in the air.

Referring to item (3), on medium and large aircraft it is essential to lock the flying controls when ground-handling is in progress, even if there is no wind. Frequently, at busy airports, the slipstreams of passing taxying machines actuate control surfaces until their travel is abruptly arrested by the limit stops; a sight and sound at which the rigger becomes aggravated, and rightly so, but which usually has little effect upon the ground crew. It is heartening to see that the old type of "nuisance bar" cockpit lock is now giving way to internal locks at the surfaces, actuated by a lever on the control pedestal or auxiliary dashboard, inter-connected to a safety device to prevent take-off with the controls locked. Unfortunately due to restrictions in available space and to the large areas involved, internal locks can be designed only to withstand wind velocities up to about 40 m.p.h.; speeds in excess of this necessitate some form of external locking strut braced to the static structure.

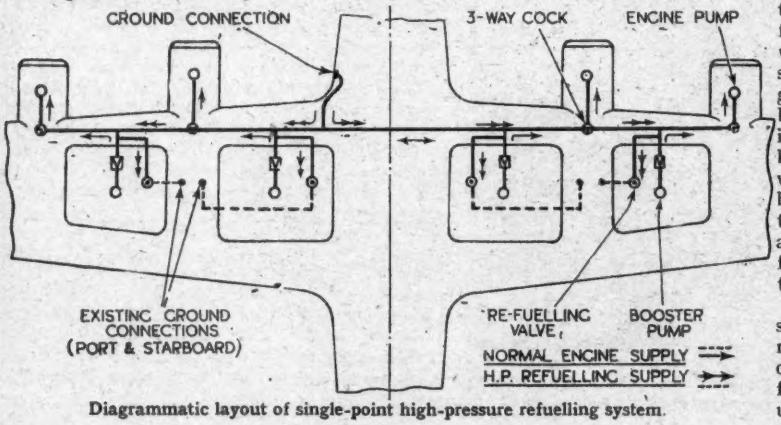
Item (4) brings up two troublesome points. One is that engine and cockpit covers sometimes are too heavy to lift and cumbersome to spread, due to their being produced in large sections. The other point is that the protective treatment on connecting clips soon wears away, resulting in rusted or corroded fittings which cannot be used. Covers should be secured by strong "tie-up" type ribbons or cords instead of by clips.

The second part of servicing comprises flight preparation procedure. Briefly, this may be described as that section of servicing, supplementary to inspections between flights, which is necessary for despatching an aircraft either from a terminal airport or from intermediate points *en route*. It comprises:—

Primary requirements: (1) Refuelling; (2) Refilling oil tanks; (3) Refilling high-volatile priming fuel tank; (4) Refilling water/methanol tank (if installed); (5) Topping up airscrew de-icing glycol tank; (6) Sweeping laminar-flow aerofoils.

Secondary requirements: (7) Disposing of and replacing toilet equipment; (8) Recharging galley water system; (9) Revictualling.

Quick turnabouts, and consequently high utilization, depend upon the ease with which these nine operations can be accomplished. Referring to (1), the advent of high-pressure refuelling and off-loading has already done much to eliminate time wastage, but this factor could be further reduced if it were made possible to refuel all tanks simultaneously by means of one ground connection. This feature could be incorporated quite easily by taking the ground connection from the balance pipe between the tanks, and would possibly reduce airframe weight by making separate ground connections unnecessary (see diagram). An additional advantage is that one refuelling tanker could do the work of two.



Diagrammatic layout of single-point high-pressure refuelling system.

Now that quickly-detachable and self-contained power plants are in common use, instances occur where the oil tank, supplied by the engine manufacturer, is packed so tightly into the unit that refilling it becomes a task

calling for contortionistic ability on the part of the maintenance engineer. There was a time, in the earlier days of aviation, when reasonably long filler necks were deemed indispensable, but nowadays, unfortunately, fashion appears to dictate that flush-fitting filler caps must be fitted, irrespective of the fact that the access panel, specified for refilling, is sometimes as much as eighteen inches away in the power plant cowling. If a filler neck were fitted, not only would servicing be easier and quicker, but less oil would be splashed about the engine, and the area of the access panel could be considerably decreased.

The servicing of items (3), (4) and (5) sometimes suffers in the same manner, and steps should be taken, *in the design stage*, to ensure ease of access to these components.

The sweeping of laminar-flow aerofoils (6) is a problem which will have to be solved in the very near future, and on large aircraft the use of overhead gantries, to support members of the ground staff equipped with long-handled sweeps, may be necessary. The importance of adequate sweeping of dust and insects adhering to the skin surface cannot be over-emphasized if the aircraft is to maintain the high performance associated with the low operating costs which this design feature makes possible. The incorporation of boundary layer control and jet engines in high-speed transports will require special attention.

The secondary requirements for flight preparation, (7), (8) and (9), are items calling for tactful design layout. On large machines it is reasonably easy to provide a freight door on the starboard side of the rear fuselage, inter-connected to the toilets, through which access may be gained for renewing the toilet equipment while the port-side door is being used by embarking passengers. Similarly, on large aircraft provision can be made for a crew access door in the front portion of the fuselage, through which the revictualling operations may take place, thus cutting down turn-around time.

Unfortunately, the number of doors and access panels in a small feeder-line machine is limited, but in any case galleys and toilets are not often required in such aircraft due to the fact that the short distances over which they operate involve less time in the air.

One item not listed above, which sometimes comes into the inspection between flights schedule, is the inspection of the instruments and their piping and electrical wiring connections. This seemingly small operation could be made very much easier if all instrument panels were made to hinge into the cockpit, a detail calling for little extra design work.

Maintenance

The main requirements for General Maintenance are: (1) Slinging, (2) jacking, (3) lubrication, (4) rigging flying controls, (5) rigging engine controls, (6) refilling hydraulic reservoir, (7) recharging pneumatic system cylinders (if installed).

Although very little can be done to produce lighter jacks for operation (2), ancillary equipment supplied by the aircraft manufacturer for slinging (1) is often too heavy to lift and cumbersome to manhandle into position. Instead of using rolled-steel members or steel tubes for this gear, attention might well be directed to the question of producing these essential parts from the light alloys, suitably reinforced by bracing to withstand the high loads encountered. When, for example, a sturdy ladder or engine sling is required for a freight transport, to be carried during flight, it is made from light alloy and undergoes much rough treatment when in service. Surely, then, the same principle can be more extensively employed for ground equipment.

Lubrication brings to the fore but one important matter concerning the maintenance engineer, namely ease of access to the lubrication points. On an aircraft designed from an ease-of-maintenance viewpoint, grease guns with necks twisted into fantastic shapes would not be required. Obviously, this would be an engineer's dream, and such equipment is often necessary, however good the design. The main consideration, however, is that it should be possible to reach the grease point by using these guns, without having to use more tools, special spanners, and removing other components in the vicinity before access is gained. So far as possible, all such special equipment and tools should be made redundant by making adequate provision for general maintenance.

Items (4) and (5) require particular care, and in this respect it would be very useful if the fuselage control rods or cables were directed along a wide shallow trough under the cabin-floor panels to avoid dropping spanners and scrap locking wire on to the bottom skin. When this occurs, on large aircraft, much trouble is experienced in retrieving the objects; in some instances they fall unnoticed and remain between the floor and the skin with consequent risk of fouling the controls in flight.

Refilling the hydraulic reservoir and recharging the cylinders of the pneumatic system (6) and (7) are two operations with which little trouble is experienced, apart from the access panel to these points sometimes being too small. In the case of the hydraulic reservoir, the chief cause of difficulty appears to be the lack of a sufficiently long filler neck.

Many of the drawbacks associated with general maintenance are not applicable to minor and major overhaul operations. This is mainly due to the fact that, once the main components are removed, the dismantling can be done in a jig or on the bench. The points to be watched, therefore, are those connected with the removal of the main components; quickly detachable wings, tail units, and undercarriages, all make for speedy overhauls.

Technical Publications and Maintenance

The importance of sound maintenance and overhaul manuals cannot be over-estimated, for on them the engineer relies for correct instructions regarding his duties. There is still much controversy about the best method in which to present this information; whether to make separate chapters of servicing and maintenance or to include these instructions after the description and location of a component has been given.

The first method has a possible advantage where light aircraft are concerned, but on large machines, where several engineers are engaged on servicing different components simultaneously, the latter system is preferable, as the number of cross-references in the text is reduced. However, if the manual were produced in quickly detachable sections, then each man could have beside him the appropriate instructions for the job in hand, thus cutting down the wastage of time necessitated by journeying up and down ladders or platforms to borrow the complete manual.

Whichever layout is used, it is essential that manuals for civil aircraft are fully comprehensive. It must be remembered that the private operator does not have access to all the official publications, and aircraft can be unnecessarily grounded due to the text stating that a particular component of, say, the electrical system "should be returned to the manufacturer in the event of failure." The trouble may be caused by a stray cable or terminal, a fault which the maintenance engineer could easily correct.

Incidentally, bolder steps should be taken to make the layout of both the text and drawings more attractive in order to capture the immediate interest of ground staff members and to encourage them to regard the Maintenance Manual as a work of easy reference, sound advice, and accurate instruction. In this respect, more use could be made of coloured perspective and system drawings. In fact, expense should not be an excuse for producing a Manual with typewritten text and monotone drawings; without a Manual, flight operations would be impossible.

The points raised in this article are by no means exhaustive, and most maintenance engineers could prepare a long list of reasonable criticism regarding practical requirements. What seems to be necessary is a connecting link between design and practice, and this could probably be met by appointing maintenance committees to perform liaison duties between these sometimes conflicting elements. One thing is certain: the foundation of sound servicing and maintenance standards must be laid during the early stages of all new designs.

Congo Bound

Part II. Flying in the Congo : A Visit to Lagos : Airfield Facilities, Lympne to Leopoldville, Summarized

By D. W. WEAVER

A LITTLE information about the organization of civil aviation in the Congo may be of interest. There is one Director of Aviation who issues licences, C. of As, etc. A certificate of airworthiness is issued every six months, and consists of the Director of Aviation having a quick look over the aircraft, and if, in his opinion, everything is in order he issues the new C. of A. free of charge. As I have said, no landing fees are charged, there are usually no hangars to pay hangarage for, and no one appears to have heard of daily or 50-hour inspections. All in all, keeping an aircraft in the Belgian Congo is a very inexpensive business.

Visit to Lagos

After a short rest in Leopoldville* I set off with Major Duncan-Smith for Lagos, where he had some business to transact. We flew to the mouth of the river Congo, landing at Moanda, where there is an excellent runway. This is used solely as a private strip by a Mr. A. Fischer, who owns two Aeronca Chiefs and a Miles Messenger. The latter, incidentally, is the one Alex Henshaw flew out to South Africa as Miles' demonstration model. I have since flown the aircraft, and it appears to be standing up to the climate very well.

From Moanda we flew up the coast, landing at Point Noire in the French Congo. The airfield was a typical example of the French Air Force stations we encountered along the route. The runway was in an advanced state of disrepair, the living quarters of officers and men alike were filthy, and the only serviceable aircraft appeared to be Ansons. After a two-hour wait for petrol we took off for Mayoumba, here we had to spend the night in an incredibly filthy rest house, sleeping two in a small bed as it was the only one with a mosquito net.

On the next day we flew on to Douala, calling in at Port Gentil. Douala is in the French Cameroons, and the hotel accommodation here was once again dirty to an extreme. The airfield, with one long runway, was the best encountered in French territory. Next morning we took off at first light and encountered bad weather over the hilly country of the interior. Low cloud was obscuring most of the high ground, and after I had flown through what looked like the worst of the weather the Major took over and I put down the back of my seat and went to sleep on the luggage in the rear of the cabin. The Major has about thirty flying hours to his credit, and is shaping well above average, but his over-confidence cost me a few grey hairs. I suddenly woke up to find the aircraft in cloud and the Major happily flying on instruments with the directional gyro looking like a roulette wheel. He had seen a hill ahead and had climbed up into cloud to avoid it. I spent an anxious ten minutes trying to get up through the cloud wondering which hill we were going to hit first. When we did eventually break cloud there was a 6,000 foot peak just to starboard of our course. Our altitude was then 4,000 feet. After that little incident I remained awake!

The art of balance.

We made our first landing in British Nigeria at Benin City, where there is a perfectly-kept airfield with two grass runways. Although we were the first aircraft to land there in six months (and also they weren't expecting us), we were refuelled and having a drink with the airport manager within 30 minutes. Next stop was Lagos, and to relieve the monotony of flying straight on a course we low-flew along the beach for an hour. It was rather amusing to see a native woman with a huge basket on her head running at full tilt up the beach without the basket showing any signs of falling off. Some native fishermen must have thought we were rather low, as they all abandoned ship when we went down to have a look at them!

After two days in Lagos we started back for Leopoldville. This time we flew *via* Port Harcourt, Douala, Libreville, Point Noire, and Moanda. Between Libreville and Point Noire on both the outgoing and return journeys we saw plenty of game. We low-flew over several great herds of buffalo, and took photographs from almost over their heads. Antelope and wild pig were also a very common sight.

Back in Leopoldville I added up the total mileage flown and found it to be just over the 10,000 mile mark. It had taken a little over 100 flying hours of anxiousness, worry, boredom, excitement and sheer good fun to make my demob. leave a very memorable one.

* *The flight from England to Leopoldville was described last week.*

"Between Libreville and Point Noire we saw plenty of game." Antelope, herds of buffalo and wild pig were quite a common sight.

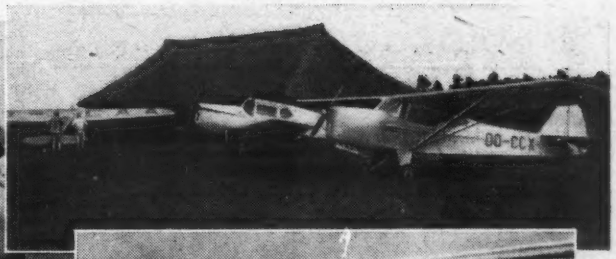
Summary of Airfield Facilities

TOUSSUS LE NOBLE

Customs: On airfield. (Required all baggage to be unloaded but later compromised by examining one small valise.); *Petrol:* All grades of Shell; *Landing fee:* 80 francs; *Met.:* In control buildings; *General:* One metal-strip runway. Very soft ground off runway. Landing made uphill in preference to into wind. Refreshments airfield buildings.

LYONS

Customs: On airfield; *Petrol:* All grades; *Landing fee:* 80 francs; *Met.:* On airfield. *General:* One long concrete runway in rather



(Top right) The Autocrat at Thysville (where we went on a hunting trip). The other aircraft are Mr. Fischer's Messenger and an eleven-year-old Leopard Moth, the first aircraft to be registered in the Congo. (Above) Manpower is apparently no problem to the Shell organization at Juba, Sudan. (Right) The author and Autocrat OO-CCX.

poor condition (small ruts between each concrete slab) and one small grass strip. Taxis into town (to Hotel) 500 francs.

NICE

Customs: Just outside airfield; *Petrol:* At least 73 and 100; *Landing fee:* 40 francs; *Met.:* Across road from airfield; *General:* One runway on seashore west of town. Good condition. One cheap café.

AJACCIO

Customs: No recollection of Customs official, but stamp appeared in log book with Customs clearance; *Petrol:* 80 and maybe 100 (no filters used and bowser let more petrol leak on to ground than into tank). Used own filter and found chamois leather filthy afterwards. Shell agent wanted signature for 110 litres when correct amount was 80 litres; *Landing fee and hangarage:* 124 francs total; *Met.:* On airfield; *General:* One gravel runway in good condition and another being constructed. Airfield closed between 6 p.m. and 8 a.m. Small military hangar. Air France buses occasionally run into town. Taxis 500 francs. Hotel des Etrangers very good (old R.A.F. rendezvous.) No departure signal sent to Tunis.

TUNIS

Customs: In airport buildings; *Petrol:* 80 and 100; *Landing fee:* 80 francs; *Met.:* On airfield (accurate report received); *General:* Two excellent runways. Very efficiently run airport. Good but expensive restaurant, also an exchange bureau in airport building. French currency and travellers' cheques not accepted.

TRIPOLI (Castel Benito)

Customs: None; *Petrol:* All grades. Shell extremely efficient and quick here; *Landing fee and hangarage:* 5s+4s (as at all R.A.F. stations); *Met.:* On airfield. (Excellent forecast received, as at all R.A.F. North Africa airfields); *General:* Three good runways 18 miles south of Tripoli town. R.A.F. provide meals and accommodation and give every assistance to civil aircraft.

MARBLE ARCH

Appears serviceable from the air and 73 octane said to be available.

BENGHAZI (Benina)

Customs: None; *Petrol:* 80 and upwards. *Landing fee:* Standard R.A.F. charge. *Met.:* In control buildings; *General:* Two tar runways and one gravel nearly completed. Meal obtained in N.A.A.F.I. canteen. Accommodation in emergency.

TOBRUCH (El Adem)

Customs: None; *Petrol:* 73, 87 and 100; *Landing fee:* Standard R.A.F. charge; *Met.:* In control building; *General:* Three good runways. (One all-weather, two hard sand.)

CAIRO (Almaza)

Customs: On airfield. All personal kit was literally ransacked and small charge made for each case inspected.); *Petrol:* All grades. *Landing fee:* Very reasonable (exact sum forgotten); *Met.:* In airport building; *General:* Egypt's main airport, with three good runways. Light aircraft can land off runways. (Misr Airworks did 50 hours' inspection on aircraft for £10.) Hotel accommodation in Cairo easy to obtain.

LUXOR

Customs: None; *Petrol:* 80 and 100; *Landing fee:* As at Cairo; *Met:* Rough forecast can be obtained from Egyptian Air Force.

WADI HALFA

Customs: Officer comes in from town six miles away; *Petrol:* 73 or 80, and 100 (at least); *Landing fee:* Monthly landing permit to cover the whole of the Sudan obtainable in Khartoum for £2 10s (cheaper if 4 or more landings are to be made); *Met.:* In control tower; *General:* One tar and two sand runways seven miles east of town. Excellent accommodation in Nile Hotel.

KHARTOUM

Customs: On airfield; *Petrol:* All grades; *Landing fee:* £2 10s; *Met.:* In control tower; *General:* Three tar runways in good condition. Very good accommodation usually available at Grand Hotel.

KOSTI

Appears serviceable from the air.

MALAKAL

Customs: None; *Petrol:* 73, 87 and 100; *Met.:* In control tower; *General:* Two easily distinguishable tar runways. Hotel nearby for meals and accommodation.

JUBA

Customs: Officer comes out from town; *Petrol:* 73, 87 and 100; *Met.:* From Khartoum at 7.30 every morning; *General:* One good gravel runway and one bumpy grass strip. Airfield staffed by very unhelpful R.A.F. personnel. Meals and accommodation, at very reasonable price at Sudan Railway's hotel nearby.

KISUMU

Customs: Officer comes out from town three miles away; *Petrol:* 73 and 100 (at least); *Landing fee and hangarage:* £1 6s total; *Met:.* In control tower; *General:* R.A.F. airfield, with two runways in good condition. Taxis obtainable to hotel in town—very comfortable, but may be crowded if arrival coincides with B.O.A.C. aircraft.

TABORA

Customs: None; *Petrol:* 73, 87 and 100; *Landing fee:* 5s; *Met.:* By radio from Nairobi; *General:* Two runways in good condition. Airfield run by very helpful South African, who supplies taxi to hotel in town. Accommodation and food only fair.

[On entering the Belgian Congo I found that there were no Customs except at Leopoldville, landing fees are not charged anywhere, and at most places met. information has never been heard of.]

ALBERTVILLE

Petrol: Most grades except 73 and 80; *General:* One grass strip rather bumpy, but in reasonable condition. Telegrams are sent notifying one's departure, but usually arrive after you have left airfield concerned.

KABALO

Petrol: 73 octane; *General:* One grass strip, with Shell agent in attendance during day. Advisable always strictly to supervise refuelling in the Congo. (Just in time to stop native putting oil in overload tank!)

KABINDA

Petrol: 73 octane; *General:* Two airstrips, one a tar runway 4 miles from town, the other, a grass strip in centre of town. Very good hotel (Hotel des Aviateurs).

BANNINGVILLE

Petrol: 73 octane; *General:* One mud strip liable to be unserviceable after heavy rain. From Port Franqui to Banningville along

CONGO BOUND

river there are fairly well kept emergency fields every 40 km.

LEOPOLDVILLE
Customs. On airfield; *Petrol:* All grades; *Met.:* On airfield; *General:* Main airport of the Congo. One long concrete runway, in good condition (railway running across the middle).

FROM LEOPOLDVILLE TO LAGOS AND RETURN

MOANDA
General: One concrete strip in need of repair and a windsock.

SAINT NOIRE
Customs: Police from town inspect passports; *Petrol:* 73 and 87; *General:* One rather poor gravel strip. French Air Force station.

MAYOUMBA
General: Grass strip in the bush. One extremely dirty rest house.

PORT GENTIL
General: One gravel strip (being enlarged)—nothing else. Petrol obtainable in about two hours from Shell agent (English trading firm) in town 7 miles away.

LIBREVILLE
Petrol: 73 and 87 at least; *General:* One grass strip and an overnight hangar for aircraft. At least 73 and 87 octane. Hotel in town best seen on West Coast (which isn't saying much).

DOUALA
Customs: On airfield, but immigration authorities have to be seen in town; *Petrol:* 73 and 87 (from Shell agent); *General:* One good gravel strip with large hangar nearby. French Air Force station. All hotels filthy to an extreme.

PORT HARCOURT (Nigeria)
Petrol: 87, 90 and 100 octane; *General:* Two excellent all-weather grass strips. As everywhere else visited in Nigeria, airfields perfectly kept and efficiently run.

BENIN CITY
Petrol: 73 at least; *General:* Two excellent all-weather grass strips. If no hotel available near airfield in Nigeria, accommodation always offered by hospitable English residents.

LAGOS
Customs: Officer in attendance certain times of the day; *Petrol:* All grades; *General:* Main airport of Nigeria used by R.A.F. and B.O.A.C. and run by civil authorities. One tarred runway and one grass strip, both in good condition. Airfield 10 miles from town. Hotels only fair.

B.O.A.C. CAPTAINS HONOURED

LORD KNOLLYS presided at a luncheon given last week by B.O.A.C. in honour of two of its old-timers, Capts. O. P. Jones and Dudley Travers. He jestingly referred to the fact that the corporation does not encourage "records" (a reference to the flight made by O. P. Jones a few days previously, when he crossed the Atlantic in 5 h 28 min) and said that records and schedules do not go well together. He was glad to pay tribute to these two captains, and through them to the other great captains of the past and of the future. Their flying careers had been outstanding and were now coming to an end so far as B.O.A.C. was concerned, Capt. Jones going to the Irish company, which is to operate Atlantic services in competition with B.O.A.C., while Capt. Travers would, he hoped, do useful work in helping to develop the new large Saro flying-boat. Capt. Jones's training had been incomplete in that he had never piloted a flying-boat!

Lord Knollys said the great feature of the careers of these two old pilots had been the personal contacts and many friendships they had formed during their long service, thus building up a very valuable tradition of service to airline passengers.

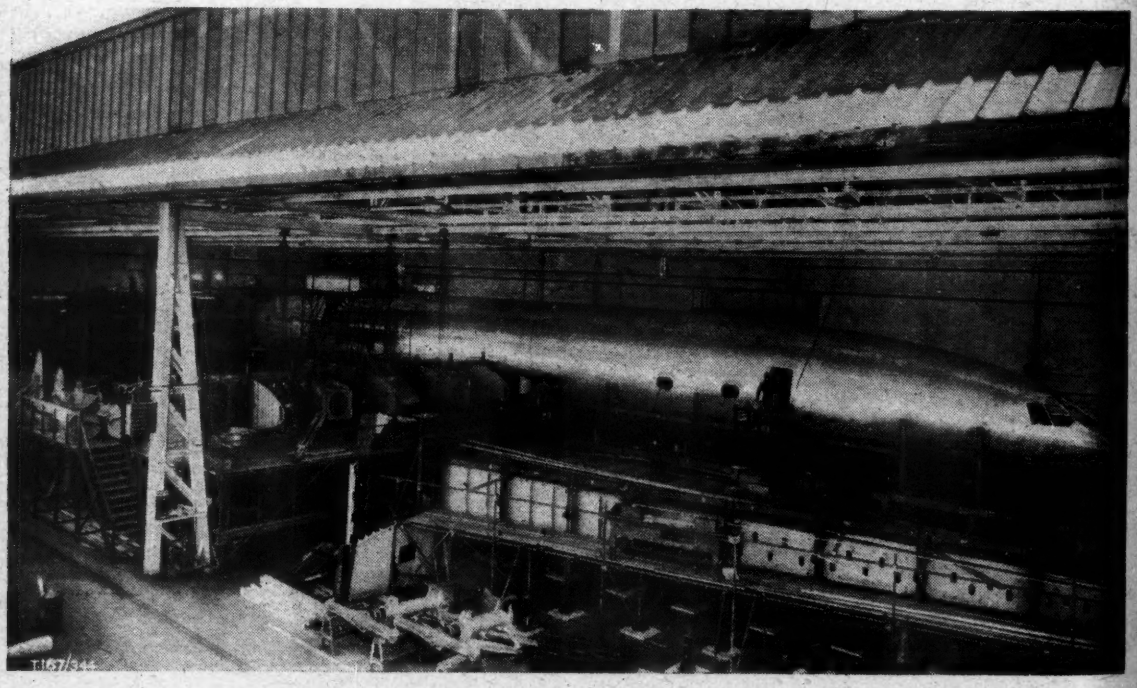
Referring to the recent announcement that there are to be no more American aircraft for Britain, Lord Knollys said B.O.A.C. would do its best with available British types and would provide a *different* service. Details were now being worked out for operating routes with the Solent and Plymouth flying-boats.

Capt. Jones assured Lord Knollys that his fast last flight was quite unpremeditated. He recalled that many pilots had given their lives in the service of aviation, and was glad to see present two old-timers such as Capts. Bailey and Wilcockson. He paid a warm tribute to his wife, without whose care and encouragement he would not have been able to carry on the work.

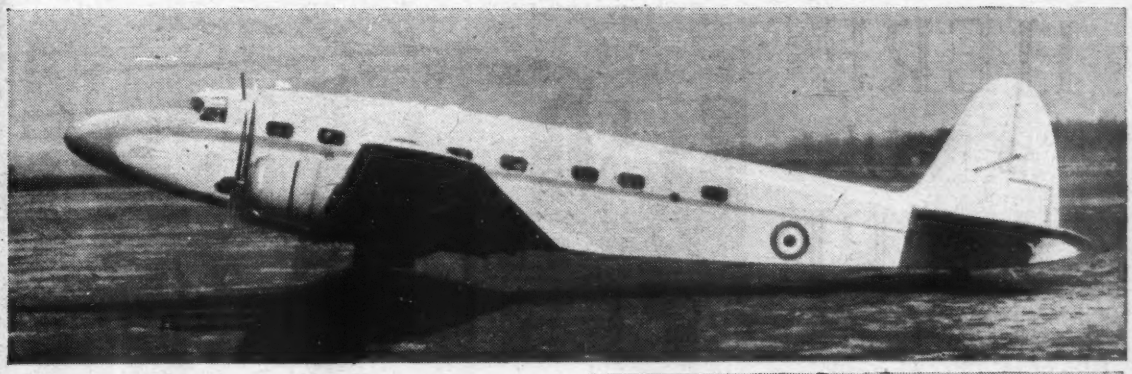
Capt. Dudley Travers paid a tribute to the engineers and ground crews, without whose conscientious work the good safety record could not have been achieved.

A telegram was read, from Calcutta, whence A. Cdre. Brackley sent greetings and good wishes to his two old friends.

TAKING SHAPE



The latest production stage of the Bristol Brabazon I, showing for the first time the fuselage completely covered. The 65ft starboard outer main plane is shown under construction and the oleo legs of the Dowty undercarriage are in the foreground. The main wheels will have four 62in × 35in—29in Dunlop Compacta tyres and the nose wheel twin 38in × 11.75—17in tyres.



Though hardly comparable in performance with the latest British and American types, the S.M.95 may have a useful future.

Italian Transports

Useful Designs by S.I.A.I.-Marchetti

THREE types of transport aircraft, all with wooden wings and welded steel-tube fuselages, are offered by S.I.A.I.-Marchetti of Sesto Calende, Italy. Formerly known as Savoia-Marchetti this concern achieved considerable success before the war with the S.M. 73, 75 and 83 transports, the second type being standard equipment on certain Italian internal, European and overseas lines.

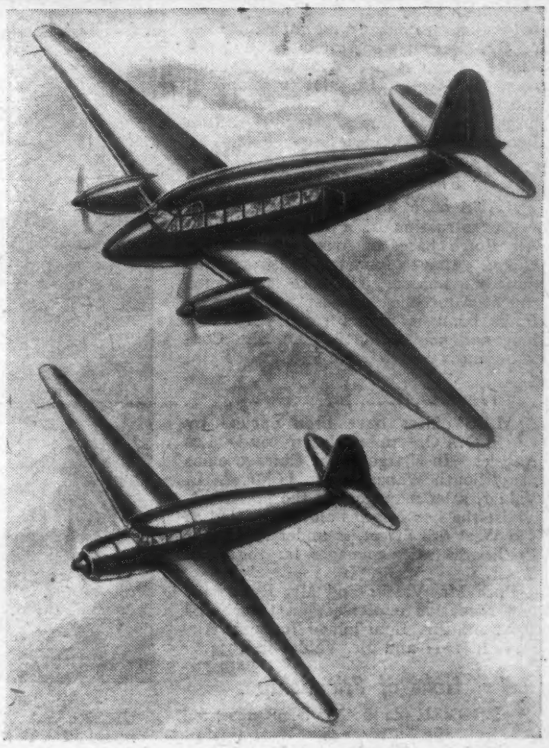
Unlike its three-engined predecessors, the S.M. 95, an example of which was brought to Farnborough for study during 1945, is a four-engined type, having a normal disposable load of 17,600 lb, which, as Guidonia tests have proved, may readily be increased to 24,250 lb.

Powered with Alfa 131 R.C. 14/50 engines, the S.M. 95 carries 38 passengers and on 55 per cent power cruises at 177 m.p.h. at 13,700ft. The service ceiling on three engines is 19,650ft. Range is quoted as 1,585 miles and the take-off distance as 460 yards.

Comparable in many respects with the D.H. Dove, the S.M. 102 seats eight passengers and two pilots. It will be seen that the wing is of high aspect ratio; this, in conjunction with a moderate wing loading, high-lift slotted flaps and constant-speed feathering airscrews, reflects favourably on climb, ceiling and low-speed characteristics.

The engines of the S.M. 102 are American-built Rangers, each giving 520 h.p. at take-off. At 55 per cent of the maximum output the machine cruises at 173 m.p.h. at 19,650 ft, and on one engine has a service ceiling of 16,660ft.

The third type (S.M. 101) seats two pilots and four passengers and is fitted with a single Walter Bora engine of 235 h.p., though it is planned to instal a unit of over 300 h.p. The makers admit that the flying characteristics with the present Walter engine are "not very brilliant," but claim that the high aspect ratio (9.11) permits good cruising performance and low fuel consumption. In view of the high power loading a constant-speed airscrew is used.



The S.M.102 (top) and S.M.101 as seen by a *Flight* artist.

OLYMPIA SAILPLANE

MANUFACTURING and marketing of the Olympia sailplane has now been taken over from Chilton Aircraft by Elliots of Newbury, Ltd., who inform us that the 25 sailplanes which constitute the home market orders will now be delivered by the end of May. Estimated cost of the Olympia is £600.

LT. BRIDGE'S CRASH

REPORTS in the daily Press have mentioned fire as a contributory cause of the Meteor crash in which Lt. J. Bridge, the Gloster test pilot, lost his life, but the makers of the aircraft are emphatic that neither before nor after the accident was there any outbreak of fire. The facts, according to Gloster's, are that on the approach a gust of wind caused a wing to drop, and when the throttles were opened the engine on this wing failed to respond. The other engine, however, opened up, thereby aggravating the position.

FORTHCOMING EVENTS

May 8th.—Royal Aeronautical Soc.: "The Development of the Goblin Engine," E. S. Moult, B.Sc.
May 16th to 19th.—Royal Netherlands Aero Club. Aerial rally at Ypenburg, The Hague.
May 10th.—Air League of the British Empire (Portsmouth): Air Display at Portsmouth Airport.
May 18th.—Southern Area Model Flying Championship. A.S.T. airfield, Hamble, Hants, 2 p.m.—6 p.m.
May 16th to 24th.—Coupé Montana for jet propelled aircraft.
May 24th—Cannes Air Rally.
May 24th and 26th.—Isle of Man Air Races. Ronaldsway Airport.
May 29th.—Royal Aeronautical Soc.: Thirty-fifth Wilbur Wright Memorial Lecture "The Development of All-wing Aircraft." To be read by J. K. Northrop.
July 9th to 30th.—Air League of British Empire. Blackpool (Squires Gate) Flying displays with R.A.F. support on 9th, 16th and 23rd.
Sept. 9th to 12th.—S.B.A.C. Exhibition and Display.

HERE AND THERE

Meteor in Sweden

THE jet-propelled Gloster Meteor which made a record-breaking flight between Copenhagen and Stockholm recently, was demonstrated to Swedish Chiefs of Staff and aeronautical engineers last week. The Meteor completed the trip from Copenhagen to Stockholm in 35 minutes. The pilot was Squadron Leader Coates-Preedy.

Runway—10,000ft

PLANS have been announced for the construction of a new U.S. Army Air Force base at Aroostook County, Maine, about four miles from the Canadian border. The base is designed to cater for the heaviest and longest-range bombers and a runway 10,000ft long and 300ft wide is planned. Construction is due to begin about June 5th.

New Offices for B.O.A.C.

SALES offices have been opened by B.O.A.C. in Chicago and Los Angeles. In charge of the Chicago office at 37 South Wabash Ave., is Mr. A. L. Valder, sales manager for the Mid-West, whilst the Los Angeles office, situated at 530 West 6th Street, is under Mr. G. L. Boni, area sales manager for the West Coast.

Both Mr. Valder and Mr. Boni have had extensive experience in travel and aviation. Mr. Boni joined Imperial Airways in 1931 and Mr. Valder in 1934.

Links of Friendship

A BRONZE plaque has been presented by the City of Westminster, England, to the City of New Westminster, British Columbia. The plaque was flown across the Atlantic in a T.C.A. North Star and the presentation will be made in New Westminster on May 28th by W. Stanley Edgson, D.L., former Mayor of Westminster, England.

FAREWELLS: Photograph shows Governor-General Sir Hubert Huddleston, on his retirement, about to board a de Havilland Dove of Sudan Airways at Khartoum for the first stage of his journey home.

UMBRELLA WEATHER: Air Commandant F. H. Hanbury, M.B.E., shares her umbrella with Air Chief Marshal Sir Norman Bottomley, whilst watching A.T.S. v. W.A.A.F.S hockey match at Park Royal recently.

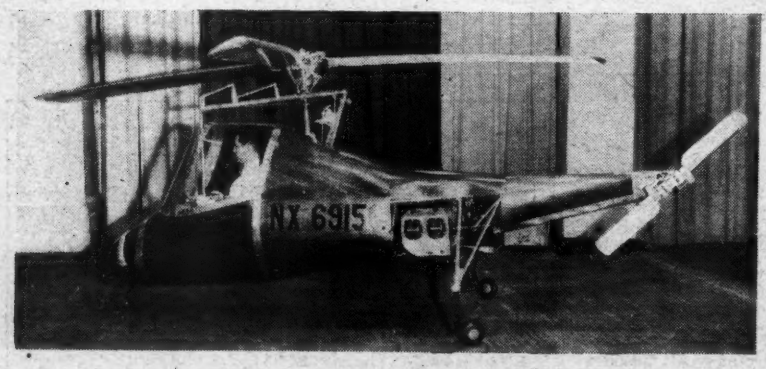
Philatelists Note

THE Swiss postal authorities have issued a special stamp in preparation for the opening of Swissair's trans-atlantic service this month.

Designed by Bernard Reber, it contains the words in English: "May, 1947. Maiden Voyage Swissair Switzerland-U.S.A." Incorporated in the design are typical Swiss buildings at one side and the Statue of Liberty and New York skyscrapers at the other. Above them appears a side view of a Douglas Skymaster with the colours and markings of Swissair.

Air-minded Police Force

IN Australia the Civil Aviation Department has arranged with the Victorian Commissioner of Police to lecture police recruits on matters associated with air navigation and general flying regulations. To keep policemen well informed, lectures will include aircraft recognition, judging of heights (low-flying pilots beware!), procedure in reporting accidents and the location of emergency exits in civil air liners. If the Victorian lectures prove successful, the experiment will be extended to include all Australian States. A special pamphlet is to be prepared for issue to all Victorian police as a guide for their actions in handling breaches of Air Regulations.



LILLIPUTIAN: This minute prototype flying model helicopter is the production of Helicopter Engineering and Construction Company of Rhode Island, U.S.A. It is claimed that the machine has flown successfully for several hours.

Commonwealth Air Council Meeting

MR. C. D. HOWE, Canadian Minister of Civil Aviation, welcomed in Montreal last week representatives of nine Commonwealth countries to the meeting of the Commonwealth Air Trans-

port Council. Mr. W. C. G. Cribbett, head of the British delegation, told some fifty Commonwealth delegates that Britain had gone to the sessions with an open mind. Mr. Cribbett, who is Deputy Secretary of the British Ministry of Civil Aviation, stated that one important policy problem for the International Civil Aviation Organization, which meets in Montreal this week, was the world-wide need to distinguish between scheduled and chartered air services. Scheduled services, he said, were limited by international agreements, while chartered services were free. About four hundred representatives of fifty countries are expected at this week's P.I.C.A.O. meeting.

Dutch Rally Date

THE date of the Royal Netherlands Aero Club's aerial rally at Ypenburg, The Hague, has now been put forward to May 16th-19th.

Key Man

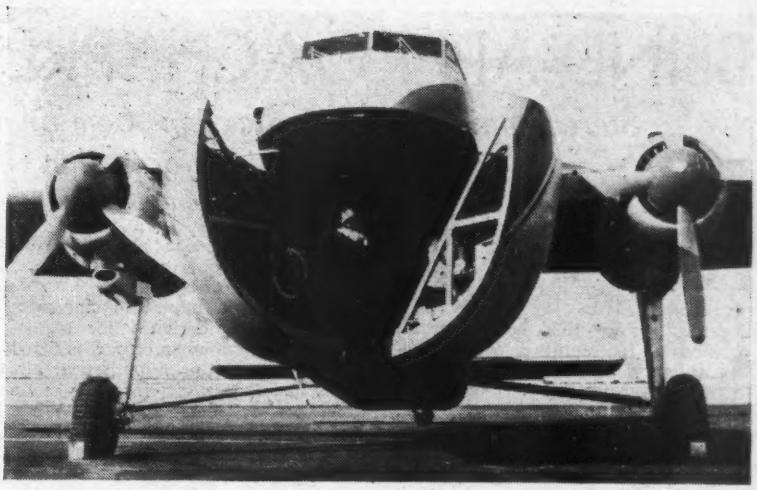
BECAUSE a ship's engineer died suddenly in Sydney, 50-year-old Sidney Rawarth, of West Hartlepool, left London Airport recently for a 13,000-mile flight to Australia. Sidney Rawarth is a chief engineer, and waiting for him in Sydney, Australia, is a 10,000-ton food ship which cannot sail for Britain until he arrives.

Still Serving

LITTLE has been heard from Service quarters of the Auster artillery-spotting aircraft used to such effect throughout the war, but from Japan comes news that twelve of these stout little aircraft are still in service, stationed at Iwakuni under B.C. Air (the Air Force component of the British Commonwealth Occupation Forces).

Shooting But No Killing

SIR GEOFFREY DE HAVILLAND has left for a short holiday in Nairobi. He travelled in the *Golden Hind* from Poole. Whilst in Africa Sir Geoffrey will go on safari to photograph wild animals in their native haunts. He already has a considerable collection of photographs of big game, which he has collected on previous trips to Africa.



• **OPEN THE DOOR, RICHARD!: A Bristol Freighter prepares to take cargo on board at Almaza airport near Cairo.**

News in Brief

THERE is now official confirmation of the new name chosen for the Armstrong Whitworth A.W.55, which we foreshadowed some weeks ago. It will be known as the Avon.

* * *

Air Service Training (Aircraft Division) of Hamble is converting and equipping two Lancasters with seats, bunks and hollowplast lining, for Flight Refuelling, Ltd.

* * *

Before the D.C.6 Mainliners went into scheduled services United Air Lines arranged for all its 12,000 employees to be given short flights. Some 2,400 flights were made at hourly intervals at stations along U.A.L.'s coast-to-coast and Pacific coast routes.

* * *

Mr. A. F. Soutar has become the first helicopter pilot of Airspray, Ltd., a Canadian member of the Hunting Group. Mr. Soutar completed a course at the Bell aircraft factory, Niagara Falls, and is the first pilot in the Hunter Group to get a helicopter commercial licence. Airspray, Ltd., will use helicopters for pest control.

* * *

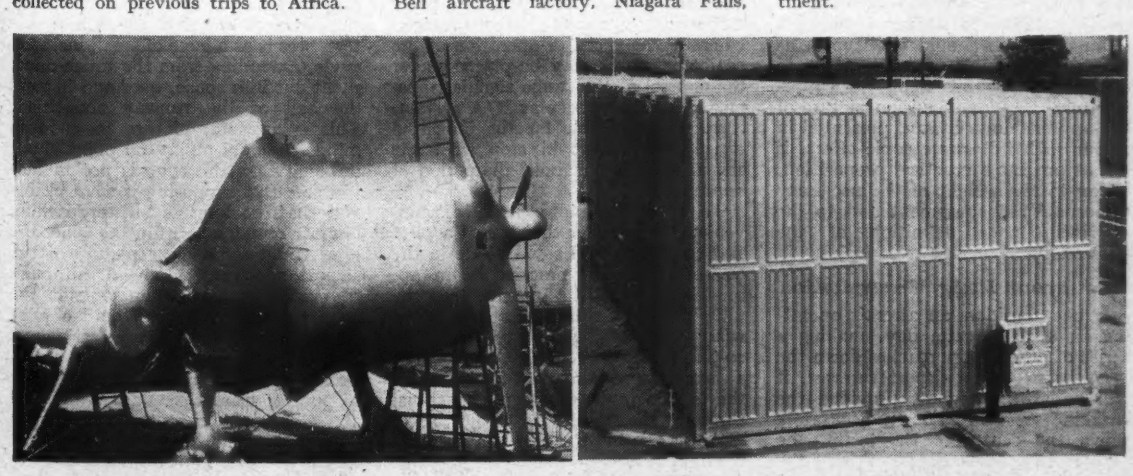
Flying Age, the American journal, formerly known as *Flying Aces*, has undergone another change in name, and will in the future bear the title of *Flying Age Traveller*.

* * *

Mr. J. R. Bushby has been appointed publicity officer to Short Brothers, Ltd. Formerly on the staff of J. Walter Thompson, Ltd., he did flying duties with the R.A.F. during the war.

* * *

Marshal of the R.A.F., Sir Arthur Harris, on a five-day visit to Montreal, said the war could have been ended before the Normandy invasion if the bombing effort had been concentrated on Germany instead of being partly used in the North African landings and partly for pre-invasion bombing of the Continent.



SKINNED AND TINNED: Two methods used by the Americans to preserve Hellcats and other war aircraft for later generations of pilots. A moisture content of 30 per cent relative humidity is maintained both in the cocoons and the airtight steel containers.

BLIND-APPROACH PRESENTATION

Stereoscopic Range Indication Combined with Essential Flight Information

By MAJOR G. H. PARKES

A RECENT article by "Indicator" (January 27th, 1947) included some apt and outspoken comments on the subject of blind-approach systems and their unnatural methods of presentation of information to the pilot. The author, who is in full agreement with "Indicator's" views, has for some time past been working on the design problems associated with this question, as there is no doubt that there exists at present a definite need for a more natural and compact method of presenting to the pilot all of the information he requires during a blind approach.

In evolving the system which this article describes, an attempt has been made to approach the problem from a new angle, by first endeavouring to determine the optimum method of presentation from the pilot's point of view, and then trying to adapt this method for satisfactory operation by the energy recovered from the appropriate signals radiated by the transmissions from existing B/A systems. In the following description the essential items of information required during a blind approach are dealt with separately in the following order:—(a) Range from estimated touch-down point. (b) Position in the beam. (c) Airspeed. (d) Height above ground level.

Clearly, a normal daylight landing carried out in good visibility is effortless for the pilot because he obtains continuous and co-ordinated information relative to range, height and plan-position, through the medium of natural stereoscopic colour vision. For this reason, any system intended to provide similar information during a blind approach should endeavour, as nearly as possible, to present it in a similarly natural manner. Unfortunately, a radar television picture of the approaching runway, presented in colour with full stereoscopic effect, is not at present a practical proposition, owing to the weight of the necessary airborne VHF equipment and to the relatively poor definition of the picture.

Continuous Range Presentation

If one considers an aircraft operating on a clear, calm day, making a series of practice approaches down the B/A beam to an airport runway, it will be apparent that, provided the machine is always flown accurately down the centre of the beam, the actual physical details comprising the view of the approaching runway as seen from the pilot's seat will be identical on each occasion; the only quantity capable of variation is the apparent rate of approach. Let us suppose that a miniature cinematograph camera, designed for stereoscopic photography in colour, is fitted in the nose of this hypothetical aircraft, and that a film record is made of a "perfect" beam approach. When this film is run through the projector of a stereograph viewing apparatus, an observer will receive a startlingly real impression of being seated in the nose of an aircraft during a daylight approach down the beam to the particular runway of the airport in question. Furthermore, by varying the speed at which the film is being run through the projector, the observer will automatically vary the speed at which the runway appears to be approaching him.

LAST week our contributor "Vertigo" stressed the importance of not overlooking the vital link between the dashboard and the controls—the pilot. He drew attention to that dangerous moment when, after a long flight, the pilot suddenly has to shift his attention to a totally different set of indications for the let-down and final approach in bad weather.

The author of the present article suggests a scheme which, if proved practical, will provide the pilot with an artificial but highly realistic view of what he would see if he were making the approach in perfect visibility.

Here, then, is a possible solution to the question of how best to present continuous range information in a natural manner, for it will be appreciated that, if means can be contrived whereby the speed of operation of the projector motor may be placed under the control of the range signals transmitted by the particular B/A system, it becomes possible for the indicated range to be kept in step with the actual range throughout the period of approach.

To make this point clearer, it is convenient to consider the case of a pilot and co-pilot seated side-by-side in the cockpit during a practice beam approach in daylight. Imagine that the pilot looks straight ahead, through the windscreen, at the runway, while the co-pilot looks through the eyepieces of a small and compact version of the stereograph viewing apparatus, through the miniature projector of which is passing the film of a previous daylight beam approach to the same runway. Under these conditions the details of the view of the runway presented to both the pilot and co-pilot will be the same.

If we further assume that, at the moment the film started to move through the projector, the indicated range as seen by the co-pilot is synchronized with the actual range as seen by the pilot, and that thereafter the speed of operation of the projector is so controlled by the B/A transmission signals that the indicated range remains always in step with the actual range, then under those conditions there will be nothing to choose between the indirect view seen by the co-pilot as distinct from the direct view seen by the pilot. When, therefore, visibility is such that no direct view of the runway is possible, the pilot may use the indirect but equally natural view of that same runway afforded him by the stereograph viewing apparatus.

In practice, the realization of the conditions assumed in the preceding paragraph is not such a difficult problem as may at first be supposed. It is not, however, intended at this stage to describe the method of control evolved, as the successful operation of the system depends upon the accuracy with which the aircraft is held in the centre of the beam during the period of approach, and this brings us to the next item on the list, namely, information relative to the position of the aircraft in relation to the centre of the beam.

Position in Beam

An average person, visualizing in his mind a picture of the beam formed by, for example, the glide path and directional transmissions of the SCS.51 system, sees it as a cone of small included angle, extending from the touch-down point out into space, over and beyond the end of the runway concerned. This is a useful picture to have in mind, the only unnatural point about it being that the cone is not in fact visible. But supposing it *were* visible and that, so long as an approaching aircraft remained within the cone, the pilot could see a clear picture of the airport and runway ahead, although the visibility everywhere outside the cone was ten-tenths. Would a pilot have any difficulty in effecting an approach under these conditions? No, because if his aircraft swung off-course to port or starboard, or if it climbed above or sank below the edge of this imaginary cone of vision, the fact would be made known immediately to the pilot by a progressive "blacking-out" of his field of vision, originating

BLIND-APPROACH PRESENTATION

from port or starboard, or from top or bottom, according to the position in which his aircraft was cutting across the edge of the cone into the conditions of zero visibility beyond.

Now it has already been suggested that it may be possible to provide continuous range presentation in the form of a natural-colour, stereoscopic, cinematograph film reproduction of a perfect approach, which gives a picture of the approaching runway that is true in every respect, *provided that the aircraft is held in the centre of the beam.* Suppose, therefore, that we arrange that this picture shall only be visible to an observer so long as the aircraft does, in fact, remain within a few degrees of the centre of the beam. We shall by this means guard against the possibility of the range picture falsely representing plan-position, or height above ground level, actually obtaining at any instant during the approach; in other words, if the range picture is not a true one, then there must be no picture at all.

The simplest way to achieve this end is to arrange that the picture shall be "blacked-out" progressively, from right or left, or from top or bottom, in the manner described when discussing the imaginary "cone of vision" in the previous paragraph. Fortunately, it is a simple matter to arrange for such a method of indication, since it is only necessary to take our old friends the centre-zero microammeters (normally used to indicate departure from the glide-path or directional transmission data) and, utilizing them in a slightly modified form, to introduce them at some suitable focal point in the optical system of the range picture presentation in such a manner that the deflections of the respective needles cause appropriate "blacking-out" from the edges of the range picture. We have thus succeeded in presenting to the pilot such information relative to the position of his aircraft in the B/A beam that, after the minimum of practice, he will receive the information subconsciously and will automatically tend to make the appropriate corrections on the normal flying controls, while at the same time keeping his attention fixed on the range picture of the approaching runway.

Airspeed and Height

It cannot be denied that, during a normal blind approach, it is desirable to keep a close watch on the A.S.I. lest a too intense concentration on the B/A and other instruments should allow a falling-off of airspeed to pass unnoticed, with horrific consequences. For a similar reason, no pilot can afford not to keep a careful eye on the sensitive altimeter, in case unforeseen distortion of the beam is calmly directing his aircraft into the deck. This being so, it is of little use to provide a splendidly natural method of continuous range and beam position presentation if the pilot is required continually to keep shifting his attention from the range picture to the instrument board. Clearly, matters must be so arranged that the pilot, while keeping his attention concentrated on the range picture, can at the same time see, out of the corner of his eye, the indications of the A.S.I. and the sensitive altimeter.

In operation, the stereograph viewing apparatus which provides the range picture is temporarily located, as will be described later, in a position in front of the pilot's face so that he may look closely and comfortably into the eyepieces whilst remaining seated facing forward in the normal position. Consequently, a simple system of optical lenses can be placed in the bottom part of the apparatus in such a manner that, by suitable adjustment, the dials of any two single instruments located on the dashboard may be "picked out," magnified, and their images projected on to the bottom part of the range picture. Thus the pilot, watching the range picture of the approaching runway and maintaining the aircraft in the beam as previously described, is all the time conscious of the indications of the A.S.I. and sensitive altimeter.

External Form and Method of Mounting

Preliminary investigations suggest that an outer container, manufactured in the form of a box of roughly cubic shape with sides some six inches square, should be of adequate size to accommodate the required mechanism without being too bulky from a practical aspect. The complete apparatus in this form should weigh some six to eight pounds only.

This box is to be mounted by means of a counterbalanced arm in a manner which allows that, while the box is normally stowed flush with the underside of the roof, the pilot may, by reaching up with his right hand, swing it down in front of him, where it becomes automatically secured rigidly in position. He may now look closely through the usual contoured sponge-rubber face-guard provided into the eyepieces of the stereograph viewing apparatus mounted inside. When the apparatus is no longer required, a firm push sideways with the left hand will cause the box to swing back up to the roof, where it once more becomes locked in the stowed position.

Construction

The construction is based on a special design of miniature cinematograph projector, equipped with an integral optical system permitting one observer to obtain a correct stereoscopic view of an appropriate film. This projector is under the very precise speed control of a governor, which is capable of being pre-set to give any desired basic operating speed and is also capable of being altered automatically while running. An electro-mechanical computer mechanism, linked with both the governor control and the film-track control, serves two purposes. In the first place it measures elapsed time intervals occurring between certain recorded range indications on the film track and certain other range indications received externally by the aircraft, and feeds a proportionate mechanical correction to the governor.

In the second place it ensures repeated synchronization of indicated range with actual range, by a method of mechanical interlock. In a B/A system employing the marker-beacon range-signal method these two functions of the computer are separate and distinct, forming a corrective cycle repeated each time the aircraft crosses a beacon. On the other hand, with a system of continuous range signals, such as could be provided by ground or airborne radar equipment, the two functions are merged into one.

Separate film records are made of daylight correct beam approaches to each B/A runway of any one airport. These records, in the form of small reels of miniature film designed to run for about three minutes and consequently of small diameter and negligible weight, are mounted on a common spindle and may be inserted as a unit into the projector. Subsequently, the film of any particular runway may be pre-selected by means of an external dial. The spools containing the film records of approaches to the runways of any given airport are intended to be issued to airline and other operators, who will ensure that their machines always carry the appropriate spools for the terminal and diversion airports of the route being operated.

Method of Operation

In actual operation, on entering the control zone the pilot will contact control, who will give him the correct runway number for pre-selection and will give him also an estimated approach ground speed, based on knowledge of local wind velocity and direction and on aircraft type and operating weight. The pilot pulls down the apparatus and pre-selects the correct film number and also the initial basic operating speed of the projector motor, by means of another dial calibrated directly in knots. He then pushes the apparatus aside again for the time being.

On leaving the orbit circuit and passing through the approach "gate," the pilot, for the first few moments, controls his aircraft in the beam by

BLIND-APPROACH PRESENTATION

means of the normal system of instrument presentation, retained as a standby. As soon as a warning lamp indicates that the viewing apparatus has been automatically started by the first B/A range transmission signal, he pulls down the box and, looking through the eyepieces, proceeds to give his undivided attention to the range picture presented, until such time as his first officer informs him that the aircraft has broken ceiling.

The pilot now sees a natural picture of the airport runway about three thousand feet below, and about six miles dead ahead. He knows that so long as the apparatus continues to present the picture it will be a true one, so far as range and position in beam is concerned, and that if anything should go amiss with the functioning of the apparatus the fact will be made known to him at once by the extinguishing of the picture and the lighting of warning lamps, when he can immediately push the box aside and carry on, on the normal presentation. All the time he is watching the picture of the approaching runway he is making a correct mental estimate of the distance of his aircraft to touch-down point, while the slightest deviation from the centre of the beam is made known at once in the manner described. On top of this, the indications of the A.S.I. and sensitive altimeter are always before him, optically projected on to the bottom of the picture. Provision for the detection of movement about the roll axis is purposely omitted, as it seems fairly certain that future practice will be to bring in commercial aircraft, during B/A, under control of one of the latest types of automatic pilot, control corrections being made on the trim knobs and throttles.

In conclusion, the author feels that it is a bad tendency these days to lay too great emphasis on the merits or otherwise of one particular B/A system.

Surely it would be better practice to make all such blind approaches with the aid of one good system, providing main and standby methods of presentation and backed up by a second, independent B/A system (such as G.C.A. ?) which will serve to reassure the pilot by providing confirmation of the correctness of the approach he is making.

New Landing Gear

Cantilever Spring Struts : No Moving Parts : Low Parasitic Drag

A NEAT and ingenious form of landing gear has recently been developed by the Cessna Aircraft Company, Wichita, Kansas.

Essentially the new design consists of two cantilever spring struts of chrome-vanadium steel carrying the wheels. Landing loads impose lateral bending in each spring leg, the resultant being a splaying of the struts and a consonant increase in track.

Since the shock *absorption* characteristics of any form of metal spring are limited by the molecular friction of the metal, and can thus be very slight, one would naturally imagine that liberation of the energy stored during the landing impact would cause the aircraft to bounce back into the air. That this does not, in fact, occur is ascribed to the lateral deformation of the tyres acting as snubbers during the "rebound," and it is claimed that many extremely hard landings have been made without any apparent damage whatsoever.

Fatigue tests to determine the life of this form of undercarriage under normal landing and ground handling conditions were effected by imposing deflection equivalent to normal landing or taxying at a specific number of cycles per minute. A production unit was subjected to this test and completed 1,961,124 cycles before failure: another unit was subjected to a test equivalent to unusually hard landings (no data are given by the manufacturers as to the test conditions) and endured 145,131 cycles. In each of these cases the life of the undercarriage would far exceed that of the aircraft.

Cardinal points of advantage offered by this new development would seem to be complete freedom from maintenance requirements since there are no moving parts, and very small parasitic drag by virtue of the extreme thinness of the spring strut.

The new Cessna undercarriage showing the unusual thinness of the struts.

KING'S VIKING FOR N.Z. ?

REPORTS from New Zealand state that the King's Viking is to go on tour through Australia and New Zealand when the present Royal Tour of South Africa is finished. The reports may be true, or there may be some confusion with the Viking which left Hurn airport recently on a goodwill tour to the Antipodes.

TRANSATLANTIC "SPIT"

THE longest journey ever attempted by a fighter started last week when ex-R.A.F. pilot, South American Capt. Jaime Storey, flying a Spitfire, left England for Buenos Aires. One leg of the journey will be non-stop over a distance of 1,850 miles from Dakar to Natal, and is estimated to take about 8¼ hours. The "Spit" is the personal property of Capt. Storey, and is fitted with extra tanks to give it a range of ten hours. During the war Capt. Storey was engaged on aerial photography with the R.A.F.

MODEL GALA AT LANGLEY

BY permission of Hawker Aircraft, Ltd., Langley airfield will be the venue for the Northern Heights Model Flying Club Gala on Sunday, June 30th. The programme will include a flying display by full-size aircraft and contests for all types of models.

BOBBYSOX AVIATION?

A NEW school Link Trainer designed to assist teachers in making aviation realistic to pupils has now made its appearance on the American market. Like its big brother, the new Link can emulate most of the basic attitudes of real flight, and is equipped with standard instruments but no hood.

DIPLOMATIC JOURNEY

WE raise our hat to the First Secretary of the Belgian Legation at Teheran who lately flew to Teheran with his wife in a Percival Proctor I. Starting from Brussels and flying via Nice, Tunis, Benghazi, Cairo and Baghdad, 5,000 miles in all, the journey was completed without trouble apart from a heavy hailstorm over the desert.

A PIONEER REMINISCES

TALKING recently to the Yorkshire section of the Institution of Production Engineers, Mr. Robert Blackburn recalled some of his early experiences as a designer, constructor and pilot. Describing his first "flight" he said: "After racing along the sands at what seemed a dizzy speed, the machine certainly took off and then started a series of wobbles. Inexperience of manipulating the flying controls, and endeavouring to keep the machine straight by too jerky action, increased the wobble and eventually ended in a side-slanting dive from the dizzy height of approximately two feet. I had probably been in the air for a minute only, but it seemed ages when I eventually pulled myself together and looked at the wreckage. That was the end of a lot of work, and of my beautiful aeroplane." The same remark was probably made at some time or other by all pioneers of flying.

HERMES FOR BRITISH AIRLINES

Specifically designed for Empire routes

Fast, comfortable Handley Page Hermes airliners, post-war civil transports in the true sense and specifically designed for the Empire routes, will be operated by British airlines.

Twenty-five Hermes IVs, Britain's fastest airliners, with a maximum speed of 350 m.p.h., have been ordered by the Ministry of Supply. These 37-ton civil transports, fitted with tricycle undercarriages, are for operation by the British Overseas Airways Corporation on its Empire services.

Designed for substratosphere flying, these high-performance airliners will be pressurised and air-conditioned. Luxurious accommodation for some 40 passengers, high speed and economical operation over Empire routes are their salient features.

Hermes IV, powered by Bristol Hercules engines, aggregating more than 8,000 take-off horsepower, cruises at 297 m.p.h., has a payload of more than 7½ tons and a range of over 3,500 miles.

Economy of operation is exemplified by the aircraft's

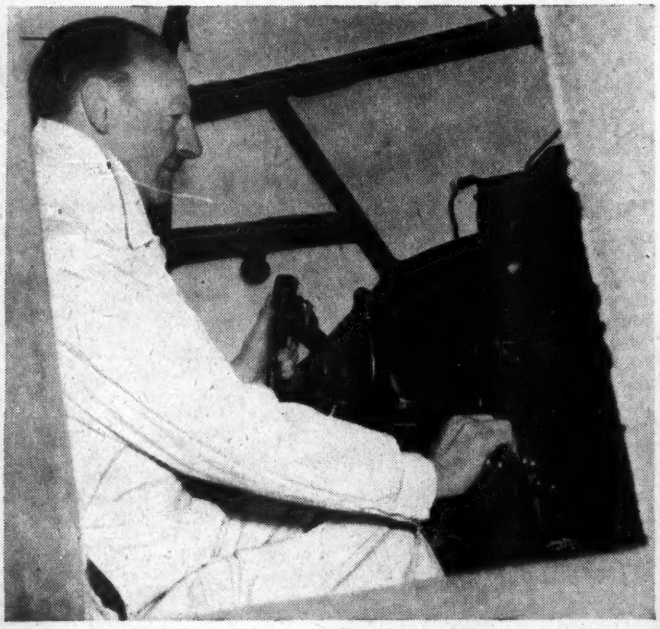
HANDLEY PAGE

HANDLEY PAGE LIMITED LONDON, ENGLAND

Britain's Test Pilot

No. 22. Capt. H. A. Brown, O.B.E.

Captain H. A. Brown made all the first flights on Avro prototype aircraft from the Tutor of 1929 right up to the Avro Lincoln. He is now forbidden by his doctors to do any more piloting, because of excess blood pressure, but he still flies as a passenger.



FROM 80 h.p. TO 6,480 h.p. : Capt. H. A. Brown in front of his 80 h.p. Gnome Avro at Redcar in 1918, and at the controls of a Lancaster during the war.

"SAM" BROWN, like many a young man of his generation, could not wait for the Royal Flying Corps to be expanded in 1914, in case the war should end before he could take part in the fighting in France. (The 1914-18 war was very popular; we were a rich country and had a three-power navy in those days.) Although a man of Kent, he joined the London Scottish after obtaining release from his indentures as an apprentice at Gwynnes and, having fought on various sectors of the Western Front, including the battle of Loos, and having seen the slaughter on the Somme, he transferred to the Royal Naval Air Service and was sent to Vendome to be taught to fly, where Lt. Carr (now Air Marshal Sir C. R. Carr, K.B.E., C.B., D.F.C., A.F.C., Retd.) was one of the instructors.

His *ab initio* training was on a wing-warping, 45 h.p. Caudron biplane, which in his opinion required much more judgment for handling than present-day aircraft. It had practically no speed range, stalling speed was within a few m.p.h. of top speed, and the nose had to be stuffed well down before one dared to close the throttle. Sam never went on air operations, but, directly after learning to fly, was posted as an instructor to No. 2 School of Special Flying at Redcar. This school was run on the Gosport model to the principles laid down by Col. Smith-Barry. Major McMinnies (for many years public relations officer of Armstrong Siddeleys) commanded the school, and when the Armistice came in 1918 he and Brown went into a huddle to find the means of earning a peace-time living.

Post-War Project

Joyriding with Mono Avros converted into three-seaters appealed to them, and McMinnies went to see the late John Lord, then managing director of Avros, and put the project before him. In passing, it is interesting to recall the part played by John Lord in the original establishment of Avros. In 1909 young A. V. Roe wanted financial aid to help him carry on experiments with his self-made 9 h.p. triplane John Lord supplied this money out of profits derived from manufacturing "Bullseye" braces, and that is why the first Avro aircraft ever to fly was called the "Bullseye."

The joyriding idea was taken up by Avros in a big way, and McMinnies and Brown, and a number of other pilots from Redcar, started up at Blackpool, where a part of the sands was allotted to them as a landing ground. It is said that in the first season alone some £10,000 was taken at this seaside resort.

Next year Brown, in partnership with Moxon, started up on his own at Rhyl, but the big profits had by then gone out of joyriding and only by virtue of John Lord forgoing all rent for the aircraft did the two pilots make ends meet at all.

Sam's next venture, which lasted from 1920 to 1926, was in Barcelona supervising the training of Spanish naval air service pilots. One of his pupils was F/L. Duran, who later flew as navigator to General Franco's brother when he crossed the South Atlantic in a Dornier Wal in 1926. Duran's end was curious. He was leading a flight of Martinsydes in a naval review when a collision occurred. Duran, in his disabled aircraft, nosedived vertically into the sea, narrowly missing a non-rigid airship also flying in the review. The remainder of the story is almost unbelievable. One of the airship officers dived from his gondola into the sea and was able to pick Duran from the wreckage under the water On reaching the surface, however, Duran died.

At the end of 1926 Neville Stack gave up his job as instructor to the Lancashire Aero Club, and Brown came home to take on the job. This brought him into even closer touch with Avros, who were then busy turning out their famous 504 trainers with Lynx engines. The late Bert Hinkler, who was then Avro's test pilot, spent most of his time at the Hamble works, and to save him endless travelling Brown started to do the production test-flying at

Pilots

vn, O.B.E.

flights on Avro
929 right up to
by his doctors
s blood pressure,
ger.

OVER THE ANDES : Part of the pass flown by Brown on his trip from Mendoza to Santiago. Mt. Aconcagua, which has to be passed, rises to 22,976ft.

Woodford Airfield in addition to the club instructing.

In 1928 the passion for record-flying persuaded Hinkler to leave Avros, and Sam Brown became the firm's chief test pilot. The Avian was in production at the time, and his first prototypes were the Tutor and the Avro Ten. The latter, for its time, was quite a complicated structure, but it is interesting to compare its 20 or so instruments with the 95 to be found on the Tudor II to-day.

Nearly the End

The initial flight on the Tutor—or Trainer, as it was then called—was made in September, 1929, and on the 19th of October, on Trainer G.AART, he had a crash which nearly finished his career. The Trainer originally had ailerons only on one plane, and while Sam was doing a slow roll at 500 ft he went into an inverted stall and dived into the deck with engine full on. His memory of events after the realization that "this is the end" is very hazy —in fact, there is a complete mental blank. One cylinder of his engine was found 209 yards from the main wreckage, and his injuries included two compound fractures of the right leg, a fractured pelvis, a dislocated spine and a cut forehead. Despite all this, he was test-flying again by the 21st of May, 1930, and in 1932 competed in the King's Cup race on the Avro Mailplane. In this race he had the mortification of seeing the winner cross the line as he was flagged off—the handicappers had skidded a bit—nevertheless, he made fastest time by clocking 176 m.p.h.

Brown's knowledge of the Spanish language stood him in good stead when, at the end of 1933, he was asked to take a 626 military trainer and a Cadet on a demonstration tour of South America. While the machines were being erected in Rio he became friendly with Col. Mello, a star Brazilian pilot, who got leave of absence to accompany Brown on his demonstration tour with the Cadet in Uruguay and Argentina. In return for his services, Avros agreed to present the Cadet to Col. Mello, who used it as his private aircraft for over 11 years. The 626 trainer Sam flew over the Andes from Mendoza to Santiago, Chile. This is a difficult journey at any time of the year, but circumstances dictated that Brown should do it in mid-winter. The mountains are some 23,000 ft high, and the pass rises to nearly 14,500 ft. Add to this the knowledge that the theoretical ceiling of the Avro 626 was under 17,000 ft, and it becomes very apparent that, at its best, the journey was likely to be a sticky one

By following the road and rail he should have been in the mountains for just about an hour, but, because these guides were obscured by snow, and a compass is quite useless while winding in and out between mountain peaks,

PROTOTYPE : The concluding paragraphs of Brown's report after the first flight of the Lancaster Mk. IV which later was renamed the Avro Lincoln.

UNDERCARRIAGE FUNCTIONING.

Both retraction and undercarriage down functioning was quite normal.

GLIDE.

This was quite normal and as already stated the lateral control was quite effective at a gliding speed of between 115/120 MPH indicated.

LANDING.

The aircraft was glided in to land at the above speed, which I think was a little too fast as there was considerable "float" before the machine finally touched down more or less three-point at an indicated ASI reading of 83 MPH. The elevator was extremely effective at this low speed, consequently there was no difficulty in getting the tail down. As already stated the brakes are most efficient and the machine was pulled up quite quickly.

CONCLUSION.

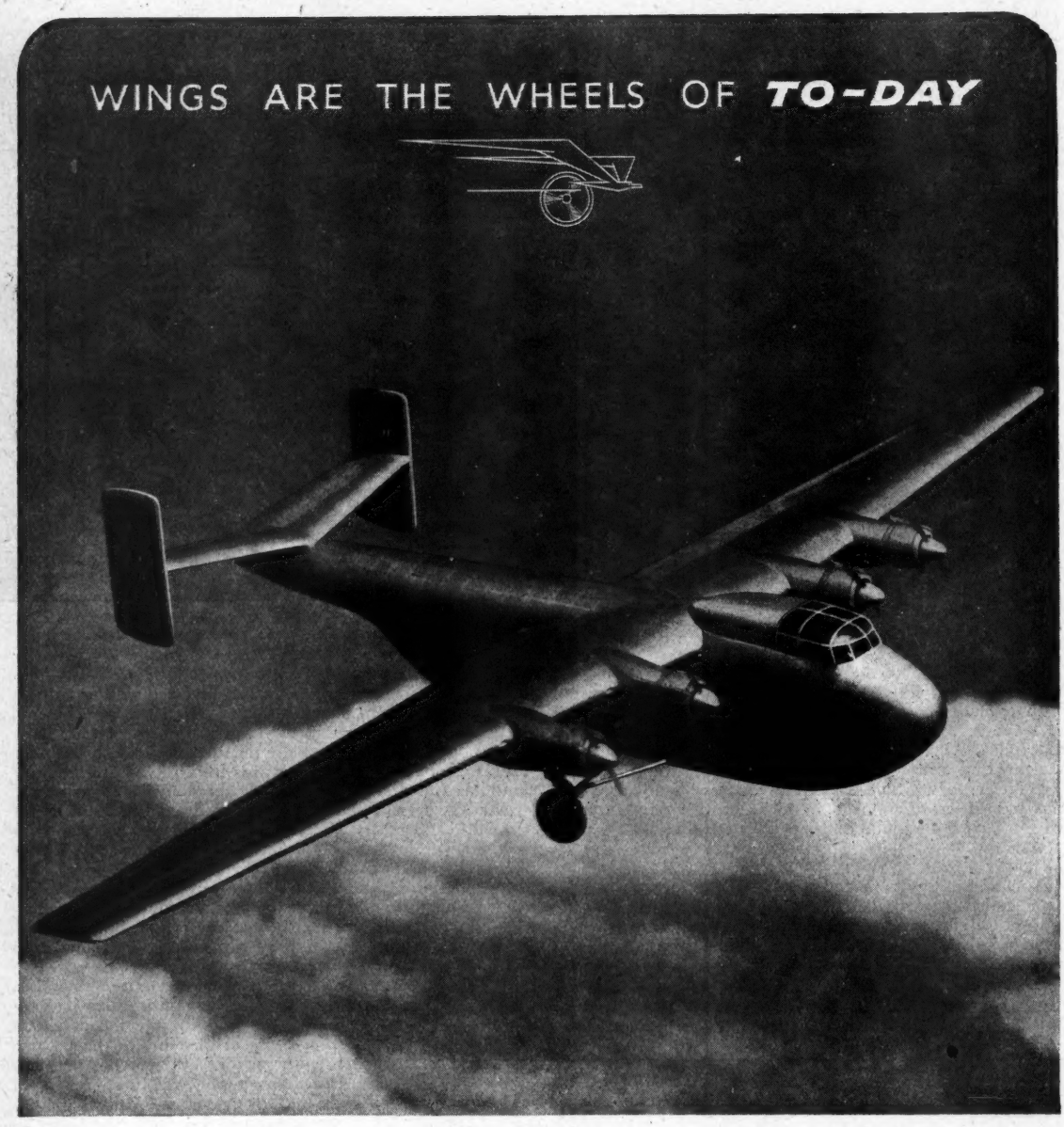
As on all other Types of "Lancaster" Aircraft, the general layout of instruments etc, is excellent. I am of the firm opinion that we have got another "winner" in the Mark.IV. I see no reason why we should not proceed with performance Trials immediately the slight adjustments have been made to controls etc.

Flight Test Observations, together with a "snag" list, are attached for your information.

Hal Brown

HAB/JW/57.(Mk.IV)

Chief Test Pilot.



GENERAL AIRCRAFT LIMITED

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BRITAIN'S TEST PILOTS

Sam lost himself and spent over 3½ hours flying over utter desolation, until, by sheer chance, he recognized the pass once more, and was able just to get back to Mendoza on the last cupful of petrol. This was not all. Air conditions in the high mountains were terribly rough, and in one bump alone he lost 1,200 ft down and in another went up 1,400 ft. In the open cockpit the cold was also intense. Nothing daunted, however, he tried again, this time more successfully, and for his efforts he was rewarded by receiving in Chile an order for £70,000 worth of aircraft out of a total allocation of £100,000 by the Chilean Government. For good measure he sold the demonstration machine as well.

1934 saw him back in England once more, testing 626s, Ansons and, later, Blenheims. On July 24th, 1939, he made the first flight on the prototype Manchester, which was the forerunner of the Lancaster. To a large extent it was also a flying test-bed for the Rolls-Royce Vulture engine and, in addition to a number of forced landings, it gave Sam a few of his most anxious moments. Under the pressure of wartime urgency some airscrew tests were being flown under unsuitable weather conditions. On the morning of the day in question the aircraft had been flown by Brown at about 500 ft, owing to low cloud. In the afternoon he was able to get to 1,200 ft and, fortunately, was still within gliding distance of Woodford airfield when the port engine broke up, more or less completely. Crankshaft broke, pistons disintegrated, and con rods poked holes in the crankcase. Luckily the Graviner worked in textbook style, and no fire resulted. Sam perched smartly and skilfully back on the airfield, and one of the flight observers, who had taken the incident somewhat to heart, ran from the Manchester, and Brown has not seen him since.

The first flight of the Lancaster prototype was made in December, 1940, on a pleasant day—not at all typical of Manchester in the winter—and it was obvious to a pilot of Brown's experience that here was an absolute winner. In fact, there were no major modifications done before the Lanc went into mass production, and of the various marks no fewer than 7,366 were built.

One of the most interesting sideshows in the testing of Lancasters was the production of 26 special machines for "Operation Upkeep" (the official title of the Möhne dam-bursting venture). The explosive missiles, to the special design of B. N. Wallis, of Vickers, had to be dropped from precisely 30 ft while flying a straight course at exactly 130 m.p.h. On the first rest run Sam Brown was at the controls and Mutt Summers, chief test pilot of Vickers, was watching the behaviour of the missile from the radar scanner blister. On impact with the water, part of the casing burst and the pieces, flying upward, hit the Lancaster, some severely bruising Summer's elbow, and others jamming the elevators. Fortunately, enough movement was left to enable Brown to keep control. For the actual run Guy Gibson ascertained his exact height by having beams from landing lights on each wing converging at such an angle that they joined on the ground when the aircraft was at the required height.

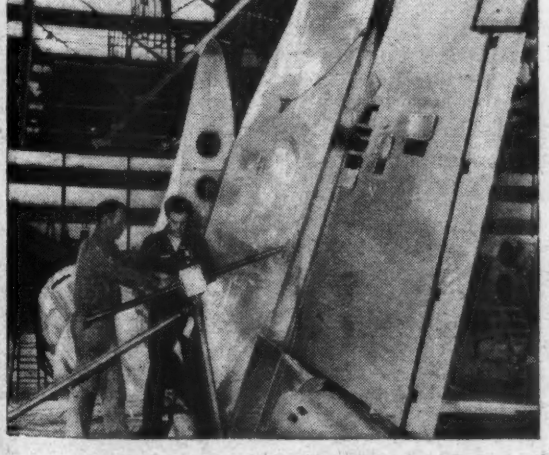
For his long service as a chief test pilot, Capt. Brown was awarded the O.B.E. in the King's Birthday Honours List in 1946. He has over 10,000 hours' flying to his credit.

J. Y.

REFUELLING: Even the *cochon de lait* appears to question Sam Brown's ability to wield a feeding bottle with the same dexterity with which he handles a joy stick.

FOLDING TAILS

A FOLDING tail, which will enable the new Boeing Stratocruisers, C-97A Stratofreighters and B-50 superbombers to be housed in standard airline hangers has been undergoing structural and aerodynamic tests. The top of the tail of the Stratocruiser is 38ft 3in from the ground, but by use of this hinge system the overall height is reduced to 26ft 7in. As shown in the photograph, a tripod fits on the port tailplane with a double screw arm fitting on the fin itself. After removing four bolts and substituting hinge pins in auxiliary fittings, the vertical tail may be lowered to clear hangar roofs or for easier servicing of rudder and controls.



Folding the fin and rudder of a Stratocruiser.

TRANSONIC TESTS

SIR BEN LOCKSPEISER, Chief Scientist to the Ministry of Supply, and Mr. B. N. Wallis, head of Vickers-Armstrongs' research and development department, lately discussed in somewhat general terms the forthcoming series of tests with Vickers air-launched, rocket-propelled, pilotless aircraft designed for measurements in the transonic speed range. The tests will start in a few weeks' time and should extend over a considerable period.

The models will be launched from a Mosquito based at St. Eval, in Cornwall, flying 36,000ft above the Atlantic. Exclusive details of the power plant and internal equipment of the models were given in *Flight* of July 11th, 1946, but it may now be stated that the thrust of the liquid rocket will be equivalent to about 2,000 h.p. at 900 m.p.h., and that the flame temperature will be about 2,000 deg C. The gases will be accelerated to some 5,000 ft/sec. Variations of the basic design, particularly in respect of wing form and tail design will be tried, the aircraft being tested in batches of six.

One or more British transonic aircraft of Delta (triangular) plan form are now undergoing development to the order of the Ministry of Supply.

DIM TYPES—*and their habits*

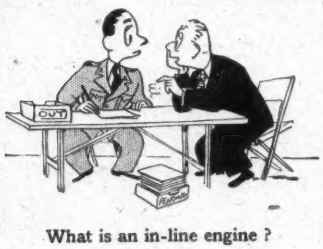
Some Back-chat About the Backroom Boys in M.A.P. Days

IN any large organization you are bound to find Dim Types. The larger the organization, the greater their numbers—and the more impossible for the Powers to weed them out. So it is casting little reflection on the now-dissolved Ministry of Aircraft Production when recalling that in its labyrinth of back rooms—where civilians served the Services — there existed quite some of the dimmest of these Types.

. . . . mumbling "good night"

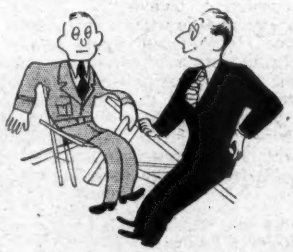
Now that full tribute has been paid, officially and unofficially, to the indispensable work achieved during the war by the Back-Room Boys, there can be no harm in recounting a few humorous incidents, which brightened our existence and by featuring in which the Dim Types responsible can be said almost to have justified their own existence.

There was, for instance, the very Senior Technical Officer, whose Homburg-hatted presence used to pass into a remote, mysterious back room rather late every morning and to re-appear, mumbling "good night," conspicuously early in the afternoon. For a while this arresting presence was accepted as being something from one of the better motor-car showrooms, now doing highly secret research on behalf of a grateful Air Force. Then the figure was forgotten, merging as it did into the background of our humdrum days, along with the man in the shabby blue uniform who sat silently in a little box at the main entrance and the bald-headed, very superior High Officials who came so often to inspect but not to interrogate us. But one afternoon the Presence actually sat down beside a junior and posed a question: "Tell me," he asked, twirling an index finger around in little circles "what is an 'in-line engine?' I thought all aircraft engines were circular."



What is an in-line engine ?

Equally strange was the head of an editorial department which vetted one's Air Publications. A bright junior had brought to him the drawing of a later-type Spitfire; in this two men were shown holding down the tail while the engine was being run up. Quite rightly the junior pointed out that this tail-squatting had long been forbidden in the Service, since there was a risk that the men might be blown off, or even, in due course, actually taken off. "Why," queried the Senior Editor, "has this been forbidden?" "Because of the slipstream, sir," replied the junior. For a long time the S.E. studied the picture. Finally, "I can't see this slipstream. Where exactly does it go?" Wouldn't Farnborough like to know that.



Made a large paper figure.

There was a feeling in all back rooms that Service personnel did not always understand civilians—and vice versa. This did not apply to a certain head of branch who had in his care some restless R.A.F. officers. These officers presently grew tired of promises of additional staff which went unfulfilled and decided to draw more vigorous attention to their feelings. They accordingly made a large paper figure of a pilot officer, with eyes tight shut and cigarette dangling from the corner of his mouth, and set this up in one of the vacant chairs before an open A.P. The newcomer was an immediate success. But one morning it was observed that one of his paper ears had gone. And it was not long before this ear came back, addressed to the officer in charge of the room. Across it, over the initials of the head of branch, was the comment: "Penalty for sleeping on duty."

Less happy was the case of another civilian, who boasted that he would apply for the services of R.A.F. personnel rather than see his department short-staffed. An imposing number of A.C.1s duly arrived, and were found quarters which were normally occupied by the back-room boys, who were then away on duty-visits. All went well for a while, but our civilian was much embarrassed when, at the end of the week the aircraftmen came to him with complaints that their laundry had not been collected and "please could they have travel warrants to go home for their week-end leave?"

. . . . Laundry had not been collected.

Flying was the cause of a lot of embarrassment. There was the very earnest civil servant, of the permanent variety, who was fed up with the fact that he never seemed to get into the air. He aired this grievance once too often—to the C.O. of a Fleet Air Arm Station—on a day of considerable mist and other contributions to poor flying conditions. Calling for a pilot, the C.O. instructed him to take the visitor to his base—and to his base he was taken, in bowler hat and rolled umbrella, back-seated in a Barracuda, at nought feet, with a series of seemingly suicidal hedge-hops.

Time-Saving by Air.

On another occasion someone else who had never flown before was about to leave to catch his train when he was heard bemoaning the fact that he would not get home until late afternoon. A kindly Polish test pilot, with a happy disregard for regulations, volunteered to fly him. Friends assured him that he would be by his own fireside in under two hours. It was nearly so. Alas, just as our civilian had spotted his rooftop from the air his pilot discovered that the undercart would not come down. By dumb show he explained to his guest that they must return to his home airfield where they would at least have the services of a fire tender and ambulance, and where the aircraft could be mended without awkward questions. So our now horrified passenger was taken back and, although the undercarriage did, in fact, come down, it was then too late to make the journey by train and nothing would have induced him to get into another aircraft—even if he had been able satisfactorily to explain, to thoroughly outraged authority, his presence in the first.

There was, too, the bright young thing who went to obtain some radio information from a firm making gliders.

She spent almost her entire time in begging a flight. In vain was it pointed out to her that it would be a terrible thing if the machine crashed with an inexplicable civilian inside. She insisted that she was insured by her Ministry for every risk and would not listen to reason. The argument got even as far as the edge of the airfield, where the glider stood tethered to an aged biplane. It seemed that she had won the day. Then, gazing up at a cloudless sky, beneath which not a blade of grass so much as shivered, the pilot saved the situation. Without a flicker of an eyelid he announced, "I will not take off in weather like this," and, turning on his heel, was gone. . . .

. . . begging a flight.

When a few lucky civilians were eventually taught to fly, the fun began in earnest. One man, told to aviate two hundred feet below the cloud base, first disappeared from view and was next seen flying his Oxford well below the level of the control tower. Called before the interested C.O. the pilot explained in injured tones that "the clouds were down to two hundred feet, anyway."

Finally, there was the story of a civilian pilot who was flying in a twin-engined aircraft with a Service instructor. The instructor suddenly said, "I'm going to cut one motor and you are to go through the drill of checking on it and trying to start it again." The port engine duly died—whereupon our civilian pilot, wearing his broadest smile and mumbling something about the petrol feed, proceeded calmly to turn off the cock for the starboard engine. "INSIDER."

CANADA NOT FORGOTTEN

NEGOTIATIONS between the British and Canadian Admiralties and Hawker Aircraft have resulted in an agreement for the supply of Hawker Sea Fury X fighters to the Royal Canadian Navy, who will thus receive them no later than will the Royal Navy.

ENGINE EXCHANGE SERVICE

BLACKBURN AIRCRAFT LTD. are inaugurating an engine exchange service which will be of particular value to club and aircraft operators wishing to maintain the revenue-earning capacity of their aircraft. The owner of an engine which is falling due for complete overhaul may, by prior arrangement, fly his aircraft to the Blackburn works at Brough, and have a fully reconditioned and modified engine installed for a fixed price. It is expected that under normal circumstances it should be possible, in the case of a single-engined aircraft, for the machine to be cleared the same day. The scheme is limited at the moment to the Cirrus Minor Series II, 100 h.p., and the Cirrus Major Series III, 145-155 h.p.

MADRID RALLY

RESULTING from a suggestion made at the F.A.I. conference held in September, 1946, by the Duke of Almodarvar del Rio, President of the Federacion Aeronautica Nacional de Espana, the Madrid air rally took place from April 18th-22nd.

The organization left nothing to be desired and grateful thanks for hospitality must go to the President and Secretary General of the Federacion Aeronautica Nacional de Espana, the Presidents of the Madrid and Barcelona Aero Clubs, the British Air Attaché in Madrid, and the Intava and Shell-Mex companies.

Throughout the four days of the rally visitors enjoyed entertainment on a lavish scale in which bull-fights and banquets vied for popularity. From Britain 19 aircraft and 52 people attended the rally, and the only mishap occurred to a Vega Gull which damaged its undercarriage on landing at Zaragoza on the way out.

SCOTTISH ACCIDENT REPORT

THE official report on the accident to the Scottish Airways Rapide which crashed seven miles north of Renfrew Airport on September 27th last year, has just been published.

The aircraft was flown by Capt. F. Stephens, who, with the radio operator and six passengers, was killed. The circumstances were that the aircraft arrived in the vicinity of Renfrew at 12.59 hr when the cloud base was 4/10th at 1,000ft and 10/10th at 1,200ft, with intermittent drizzle and visibility at two miles. A series of QDMs was given and after losing height the aircraft passed over the airfield at about 1,500ft. Six QDMs were passed in the next 2½ minutes as the aircraft flew away on a north-westerly track. At 13.23 hr a "wait" was given and acknowledged. This was occasioned by a call from another aircraft, G-ADAJ, to the effect that his petrol was running out. The message had been sent without the pilot's authority. On receipt of the message Renfrew gave G-ADAJ immediate priority and a series of homing bearings was passed to that aircraft.

Nothing further was heard from G-AFFF, which was found later to have crashed into Craigton Hill, Milngavie.

Capt. Stephens, who was 27, had a "B" licence extended to include D.H.89 aircraft, on which he had flown 45 hours as captain.

The report states that it is the general practice for the radio operator of one aircraft to keep the pilot informed of bearings being sent to another. It is almost certain, therefore, that QDMs for G-ADAJ were verbally communicated to the pilot of G-AFFF. The known track of G-AFFF shortly before it crashed bears a marked similarity to that of G-ADAJ in its approach to Renfrew, which suggests that the pilot of the crashed aircraft may have been flying on QDMs being passed to G-ADAJ. The radio operator could not have been confused as he was not working his key and had acknowledged the "wait."

The conclusion of the Chief Inspector of Accidents is that evidence strongly suggested that, following a break in the series of QDMs, the captain, as a result of a misunderstanding, accepted as a resumption of his own a series of bearings for another aircraft. The captain of G-ADAJ cannot be considered blameless for not cancelling the message.

LATEST BRITISH TRICYCLE: The prototype Cunliffe-Owen Concordia, which came out for its first airing last week-end The registration indicates a limited licence to fly until a full C. of A. is obtained.

ADMIRALTY POST LAPSES

VICE-ADML. SIR PHILIP VIAN, 53, has been appointed Deputy Chief of the Naval Staff (Air). He will continue as Fifth Sea Lord, an appointment which he has held since last July.

The separate appointment of Deputy Chief of Naval Staff, formerly held by Rear-Adml. R. D. Oliver, has now lapsed. Vice-Adml. Vian has assumed the additional duties of the lapsed appointment in so far as they affect the Naval Air Service. The remaining duties have been vested in Rear-Adml. G. N. Oliver, Assistant Chief of Naval Staff.

SPIT FLIES ATLANTIC

AS we go to press we are pleased to record that Capt. Storey (see page 420) reached Natal. Flying his Spitfire from Dakar to Natal, the 1,850-mile leg across the South Atlantic took him 8 hr. 40 min.

Private Enterprise

Scotland Welcomes Opening of New Renfrew Factory

IN these days of nationalization, the opening by private enterprise of a new factory is to be welcomed, especially when this step has been taken after very modest early beginnings. Difficulties are many, and enthusiasm is needed if the frustration met at almost every turn is not to result in ultimate discouragement.

The new factory opened by the King Aircraft Corporation at Renfrew last Saturday would never have been built if those responsible had not been blessed with almost unbounded energy and confidence. This fact was stressed by Sir Patrick Dollan, a former Lord Provost of Glasgow, who performed the opening ceremony. Glasgow, he said, welcomed such enterprise, even if the factory was situated in the neighbouring borough of Renfrew. He had followed the work of the King Aircraft Corporation from its inception, and although it appeared incredible to those who knew the old factory at Hopeton Place, Glasgow, the firm had turned out there work to the value of £500,000 during the war. We have visited these works, and Sir Patrick's statement is no exaggeration. They were more like a rabbit warren, and it is small wonder that workers and staff alike are delighted with the new factory at Renfrew which, although not very large, is airy and equipped with an excellent range of machine tools.

Owing to housing shortage, most of the workers will at present have to travel out from Glasgow, but the Provost of Renfrew promised every assistance in the way of houses as soon as labour and materials became available. The factory is sited on what was once a golf course, and the old club house will ultimately be turned into a canteen. There is enough land by the factory to make extensions possible as and when they become necessary, and the proximity to Renfrew airport should result in a certain amount of work from there.

In the main the K.A.C. factory is laid out for experimental and development work rather than for quantity production, and the firm appears to welcome awkward tasks. In view of the difficulty of getting such jobs done nowadays, there should be no shortage of work. Large factories do not take kindly to small orders, which are apt to interfere with their bread-and-butter production, but at Renfrew such inhibitions do not exist.

The opening ceremony was attended by many representatives from the aircraft industry, the Ministry of Production, the Ministry of Civil Aviation, the Air Registration Board, and the R.A.F. At the annual dinner held in the evening, Sir Patrick Dollan referred to the fact that the King Aircraft Corporation had introduced the 40-hour week before anyone else in Scotland, and that quite voluntarily, without pressure from anyone.

Major W. B. Haddow, chairman of the K.A.C., recalled that planning of the new factory began two years ago, and referred to some of the many difficulties and frustrations that had to be overcome. He hoped the workers would give of their best in the new surroundings, and expressed the view that, in spite of the belief he had met recently in the United States, in four or five years' time Great Britain would be "on top of the world again."

W/C. Fletcher referred to the difficulties they were encountering at the Royal Aircraft Establishment, due to so many technicians going back to their pre-war jobs, and said this would mean that for quite a long time to come the R.A.E. would need outside help. He thought it probable that the new Renfrew factory could help materially with small-scale experimental work.

Chairman of the K.A.C. is, as already mentioned, Major W. B. Haddow. Mr. J. McEwan King is managing director, and the other directors are Mr. T. G. Llewhellin, Mr. John Love, and Mr. R. A. G. Nierop. The last named is in charge of another K.A.C. factory at Bishop's Stortford.

"THE AIRCRAFT BUILDERS"

THE architects of Britain's wartime air strength, claims the author of a new official publication with the above title*, were those who laid down the "quality-first" principle and stuck to it. They were to be found in the Cabinet, on the Air Staff, in the Ministry of Aircraft Production and in the factories, and they undertook a tremendous responsibility, for had the Battle of Britain been lost, there would have been plenty of people to shake their heads and point out that the best was the enemy of the good, and that insistence on quality had been our ruin.

Thus the praise is justly apportioned, but no apology is needed for the sheer extent of our production. As long ago as 1936, before the expansion programme was really under way, the number of new aircraft produced was less than 2,000. In 1939 it was 8,000, and at its peak, in the twelve months ending March, 1944, 27,000. But numbers alone are no true indication of the extent of the effort, for aircraft were growing progressively bigger, heavier and more complicated, so that taking the criterion of structure weight, the total weight of aircraft produced had risen from about 4,000,000 lb in 1936 to 59,000,000 in 1940, and 208,500,000 during January to December, 1944.

The new publication, prepared for the Ministry of Aircraft Production (now incorporated in the Ministry of Supply) by the Central Office of Information, is a concise, explicit chronicle of great accomplishments and a worthy record which should find a place on the family bookshelf.

Far from giving the M.A.P. all the credit for our vast production of the world's finest aircraft, the author (Mr. Nigel Balchin) is careful to mention all organizations and trades concerned. The work of the Emergency Services Organization and A.T.A. receives due recognition, and the final chapter, "The Hands that Made Them," lists the trades and classifications of skilled, semi-skilled and unskilled workers.

With such a wide field to cover, it was, perhaps, too much to hope that the author could complete his task without erring. Should a new edition of the book be contemplated the Thunderbolt and Mustang must be eliminated from his list of "our" fighters—particularly as reference is made to their short range! Moreover, the Hampden was *not* among the bombers with power-turrets: it was designed to the German formula, so freely condemned.

* *Obtainable from His Majesty's Stationery Office, price 9d net.*

PORTSMOUTH RE-OPENS

SOME old and many new members were amongst the gathering attending the post-war re-opening of the Portsmouth Aero Club at the City Airport last Saturday. The occasion was celebrated with a cocktail party held in the new, tastefully decorated and comfortably furnished club building, which will provide a restful background to club flying. Sir Denis Daley, former Lord Mayor of Portsmouth, opening the club, recalled how it grew from its formation in 1933 and later contributed its share to war victory in training members of the Civil Air Guard. One member so trained, he said, had accounted for five enemy aircraft. Sir Denis regretted that the club had at present only 90 members compared with its 300 prior to the war, but he hoped membership would increase.

In thanking Mr. Hunting for all the flying facilities which he had provided, he referred to him as the foster-father of the club. Mr. Hunting replied, and thanked Sir Denis and the Corporation of Portsmouth for the help they had provided in the rebirth of Portsmouth Aero Club. An interesting point of Mr. Hunting's speech was that the Hunting Group would provide as many aircraft as membership warranted. Fine weather blessed the re-opening, and a few flights took place during the evening. The club's present fleet consists of two Tiger Moths, one Magister and an Auster Autocrat. We understand that additional aircraft are expected.

North Star Flight : Some Safety Figures from I.A.T.A. : New B.E.A. Safety Measures

CIVIL AVIATION NEWS

IN THE SUN : A B.O.A.C. Halton loading up. The Corporation have received eight of their total allocation of twelve. A proving flight was made recently to Ceylon, but when operations are resumed with these aircraft they will fly on the trans-Sahara route to W. Africa and will be used to step up services to Cairo.

AIR TRAFFIC CONTROL FOR EUROPE

A SYSTEM which can be put into early operation for the control of air traffic in North-West Europe has at last been agreed, and it is largely due to the efforts of the air traffic control Directorate of the British Ministry of Civil Aviation that agreement has been reached so quickly. For some considerable time the staff have been planning and accumulating data in preparation for the second special meeting of the I.C.A.O. Air Traffic Committee for the European-Mediterranean region which met in Paris on April 15th. Discussions lasted only thirteen days.

It will be remembered that last October, at the first meeting of the Committee, when, incidentally, Britain was not properly represented, the adoption of the corridor system was agreed. At this recent conference there was again, we believe, strong support for radio ranges and the corridor system, but there was in opposition a strong British delegation with a prepared paper to add weight to the argument that an area system was the better plan.

The corridor, or airways, system was thought to be too rigid to allow regular operation in crowded areas, and the present irregularity for which American domestic airlines have a reputation would seem to illustrate that point. In *Flight* of March 20th, 1947, we described the fundamentals of an area system incorporating area controls and flight safety regions, and it is such a system that has been finally adopted.

Existing navigation and communication equipment have been taken into consideration, and it is believed that if the member countries go ahead immediately the system will be in operation by next winter. August 1st has been given as the deadline for each country to have completed administrative preparations, and the special equipment required is such that no delay in obtaining it is expected. The area traffic control system is sufficiently flexible to allow new equipment to be incorporated as it becomes available. That was probably one of the strongest arguments in its favour. An I.C.A.O. office of air traffic control co-ordination is to be established in Paris to keep a watch on progress being made in the countries responsible for putting the plans into practice.

The proposed control organization will be, broadly speaking, based upon the British suggestions and the Committee have compiled, in each necessary language, rules and regulations for operation of the system, details of the administrative organization necessary, and suggestions on how each country should set about building up its own organization in order that there may be standardization from the beginning. It is understood that the British delegation also produced a standardized form of flight plan, by the use of which the language difficulty could be overcome, and which would also provide a means of ensuring that the information available to the control stations was standard. Another useful contribution was a description, in condensed form and simple language, of the entire area system for the benefit of aircrew and ground controllers. Both were accepted by the Committee.

Representatives of I.A.T.A. agreed with the British suggestions and it is understood were of great assistance in preparing the various detailed plans. The co-operation of I.A.T.A. in the development of such a scheme is essential, as the airlines do not even yet appear to realize to what extent the efficiency of traffic control is dependent upon the information made available to the ground, and it is only by good air-to-ground communication that such information can be obtained. The only areas in which the system will not be adopted are over Norway, Sweden and the American sector of Germany, where radio ranges are already installed.

It may be said that this conference has completely reversed the decisions made in October, and it would appear that the benefit of the reversal will be almost immediate and of long duration, for the problem of production must prolong the implementation of any system dependent upon specialized equipment. Although it may be necessary to organize airline standards on an international basis, for which purpose I.C.A.O. has been established, suggested practices and procedures are useless if they cannot be adopted without long delays.

The British delegation of eighteen was led by G/C. H. R. Graham, Deputy Director of Control at the Ministry of Civil Aviation, and his deputy was Mr. H. T. Wood.

CIVIL AVIATION NEWS

The team consisted of two tele-communication advisers, one operations research officer, one representative from Transport Command and one from the Admiralty. British airlines were represented by three members of B.E.A.C. and one of B.O.A.C. B.A.F.O. had four, and Air Traffic Control Headquarters at Uxbridge had two delegates, and the Berlin Air Safety Centre one representative.

NORTH STAR PERFORMANCE

THERE was a certain feeling of satisfaction when taking off last week in a tricycle-undercarriage aircraft powered by four British engines. It was, unfortunately, a new experience. As readers are aware, the North Star is now on regular runs across the Atlantic between Montreal and London, through Prestwick, and it was on scheduled flights between London and Prestwick in both directions that we had the opportunity of travelling in this new type.

The interior has been thoughtfully designed and tastefully decorated. In fact, nothing more could be desired for the comfort of passengers. In the cockpit a major degree of simplification has been achieved. The multiplicity of lever controls normally used for engine operation have been replaced by only five levers, four for the throttles and one for the pitch. Temperature, mixture and synchronization are controlled automatically within the power plants.

With a take-off power of over 7,000 h.p., using 3,000 r.p.m., 70in of boost and 15 deg of flap, the take-off was exceptionally good, and there was a high initial rate of climb. There was noticeable acceleration when the undercarriage was retracted, but no uncomfortable sink when the flaps were raised. In the event of one engine failing there is ample control, and the pilot assured us that the rudder could be held without trimming. That is important, as the rudder trimmer is well forward and, although not out of reach of the pilot, is not conveniently at hand.

The approach and landing were quite conventional. When wheels and flaps were lowered there was no marked deceleration, and the aircraft was quite stable in the approach with wheels down and 15-20 deg of flap. There was a slight change in attitude after the engines were throttled right back, and the final landing with full flap was made.

There is only one real criticism of the North Star, and that is the excessive noise, which decreases progressively towards the rear of the cabin As the standard Merlin 620 power plants are fitted with exhaust ejector stacks, we would make the suggestion, in all humility, that the fitting of tail extension shroud pipes to the inboard rows of stacks might well have a material effect on noise suppression. This would probably incur differences in exhaust characteristics as between the cylinder rows, but if the disparity was too high, rather than not use tail pipes at all it would be better to fit them to all exhaust stacks. A low-frequency vibration of quite high amplitude is apparent when standing in the aisle between seats, once again in the forward portion, although it is very much diminished when sitting down. This would appear to call for something rather elaborate in the way of cush mounting, which, of course, might well prove to be a major modification. The noise factor is unfortunate, but we understand the Mark II with DC-6 fuselage is more silent, otherwise the aircraft is good. The North Star has been designed to eliminate much of the complexity in control and to incorporate the most modern equipment.

SCOTTISH PROJECT: The prototype of the Prestwick Pioneer is well advanced. Forward visibility, even with the tail down, is below the horizontal, and the high wing and single pilot's seat allow an excellent downward view. The estimated take-off run is 95 yd, and landing, 50 yd. Cruising speed at 5,000ft will be 110 m.p.h. and the range 500 miles. The top speed will be about 126 m.p.h. and landing speed 33 m.p.h. The aircraft is all metal, with a span of 50ft 6in, full span slats, and Fowler flaps with split flaps. The engine is a Gipsy 34, 240 h.p., using 87 octane.

B.E.A. SAFETY STANDARDS

BRITISH EUROPEAN AIRWAYS have applied new safety standards which affect the permissible all-up weight of aircraft and are governed by the size of airfields from which they operate. The weight of each aircraft is to be adjusted to enable a take-off or landing run within a stated percentage of the total length of the runway, and in the event of engine failure to ensure flight over the highest obstacle in its path with a safe margin of height on the remaining engine or engines. It must be remembered that B.E.A. have adopted the take-off technique which requires that the aircraft shall fly level at a height of 50ft after take-off until one-engine flying speed has been reached, and not until then may the climb be started.

The length of runway from the start of take-off until reaching the point of climb may be termed the effective length and that length must be such that at any point after that the aircraft must clear any obstacle that may be at a gradient of one in thirty to the runway. The landing limitation is 70 per cent of that effective runway. These figures are based on still air conditions and the maximum temperature recorded in the region of the airport.

It will be remembered also that at the time of the dispute over Dakota aircraft the Air Safety Board found that the all-up weight by itself was less important that the relation of the weight to the size of the airfield from which the aircraft was operated. On the internal routes only Northolt, Nutts Corner, Renfrew and Prestwick meet the new standards for Viking operations. For Dakotas at 28,000 lb Aberdeen, Edinburgh, Isle of Man, Liverpool and Manchester meet the required standards, but Dakotas operating from Croydon, Jersey and Southampton will require a reduction in weight to comply with the new regulations.

FRENCH BOOKING OFFICE

AIR FRANCE are back at their old offices in the Haymarket, which during the war were requisitioned and used as a departure station for R.A.F. Transport Command. Since the beginning of 1946 the company have been re-establishing pre-war services and developing new ones as modern aircraft became available. As the result of an agreement between the Governments of this country and France, the British Corporations and Air France share many facilities which would otherwise be duplicated. Air France, for example, use Airways Terminal in London and traffic and ground transport facilities, while B.E.A.C. use similar facilities of Air France in Paris. The new offices were opened on April 28th by Count Hellion de Villeneuve, the commercial director, and the ceremony was attended by Lord Nathan and the heads of the British Corporations.

Air France are operating five daily services between London and Paris, and direct lines between Paris, Manchester and Glasgow, and this summer a new service is to be opened to Edinburgh.

INTERNATIONAL SAFETY FIGURES

I.A.T.A. have studied figures of all airline operators throughout the world during 1946 and produced statistics which reveal that two-thirds of the scheduled international airlines have a record of absolute safety. It is also recorded that in

CIVIL AVIATION NEWS

America non-scheduled aircraft accounted for nearly half the civil air accidents during 1946.

Sixty airlines in all parts of the world flew nearly 8,500 million passenger-miles during the year, in the course of which there were thirty-three fatal accidents involving the lives of 298 persons. This amounted to more than 28 million miles per passenger fatality.

Some members of I.A.T.A. have had no accidents at all for periods ranging from six to seventeen years. The observations made in the Association's Bulletin note that in no phase of transport anywhere is there such a continued, concerted and widespread safety effort as in aviation, safety being the primary concern of every airline and manufacturer, virtually every Government, and, of course, of the international aviation organizations.

VERSATILE TRANSPORT : Scale model of the Beechcraft 34, which is designed to carry 20 passengers and baggage, plus 1,000 lb of freight, or pure cargo, for which it may be quickly converted. Sixty passenger-miles per gallon of fuel at 180 m.p.h. cruising speed is expected and estimates indicate that it will fulfil C.A.A. single engine flying requirements.

BREVITIES

THE International Air Transport Association has approved in principle the admission of non-scheduled air carriers into the organization. The proposal to extend membership of I.A.T.A., now limited to scheduled airlines, will be ratified at the general meeting at Rio de Janeiro next October.

* * *

When B.E.A. summer schedules come into force on May 19th there is to be a daily service between Edinburgh and London, Aberdeen and the Shetlands. Flying time between Edinburgh and London will be just over two hours.

* * *

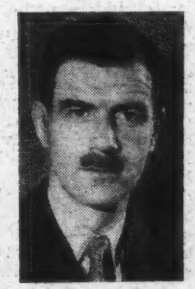
Sir Frederick Bowhill has been making a tour of inspection of likely places in Southern England for the establishment of a permanent flying-boat base. He has already visited Cliffe and Poole, and it is understood a total of about five places is being considered. The Admiralty have opposed Langstone Harbour and there appears to be some doubt whether Cliffe is, in fact, the most suitable site.

* * *

An agreement was reached last month between Air France and the Polish Airlines LOT, by which both companies will represent each other in their respective countries. There is a weekly LOT service between Paris and Warsaw.

* * *

Air Commodore C. S. Cadell has been appointed managing director of International Aeradio. The R.A.F. have specially released the Air Commodore to take up this post. He was at one time Director of Tele-communications and Signals, and was responsible for the signals and radar planning in the Middle East during the war.



A. Cdre. C. S. Cadell

* * *

The United States has decided to oppose the suggestion that a seat should be reserved for the U.S.S.R. on the administrative council of I.C.A.O. It is understood that America maintains that the council seats should go only to working members, and so far there has been no indication from Russia of any desire to participate in I.C.A.O. Co-operation in such matters as the organization of a world-wide search and rescue system has been declined.

* * *

An agreement has been signed between the U.K., U.S.A., Canada, France and Holland for financing the Loran station at Vik, Iceland. The cost of the station will be borne by the signatories in agreed proportions, and Iceland will contribute 5 per cent. An investigation is being made into possible means of reducing interference with the radio used by the Icelandic fishing fleet.

* * *

B.O.A.C. have introduced three new services. Plymouth-class flying-boats started last Friday a weekly service between the U.K. and Bahrein in the Persian Gulf, and between India and Bahrein. The third is a landplane service with Dakotas between the U.K. and Lydda once a week.

* * *

The Air Registration Board have issued a cancellation notice for attachment to D.16 Issue 2 dated September 14th, 1945. The sub-section ceases to be effective and until such time as Issue 3 is published application should be made to the Board for approval of de-icing systems proposed for prototype aircraft.

* * *

Mr. John Brancker is transferring from his post as general traffic manager in British European Airways to become manager of the Eastern Division of British Overseas Airways. The headquarters of the Eastern Division are at the recently acquired B.O.A.C. premises on the Great West Road.

* * *

Mr. C. H. Dickins, O.B.E., D.F.C., has been appointed assistant managing director of de Havilland Aircraft, Canada. In 1941 he was operating manager of Canadian Pacific Air Services, in the days of the transatlantic ferry route, and he retained that position when the route was taken over by R.A.F. Transport Command. In 1942 he became the vice-president and general manager of C.P.A.

* * *

A licensed bar at London Airport, Heathrow, was officially opened on April 25th by Catering Division, Airwork, Ltd. The issuing of a licence will undoubtedly be hailed by many visitors to Heathrow, and the bar will provide a much-needed facility in which to welcome our friends from overseas. It is hoped, however, that the service will be better than that provided by the present tea and coffee bar.

* * *

M. Jules Moch, the French Minister of Public Works and Transport, accompanied by M. Max Hymans, Secretary-General of Civil Aviation, was in this country at the end of last month at the invitation of Lord Nathan. They exchanged views on policy of mutual concern in the development of civil aviation in the light of experience since the Anglo-French agreement last year.

* * *

The Navigators and General Insurance Co. have launched a scheme for the benefit of all members of the Merchant Navy. It offers the dependent of the insured travel to any part of the world (possibly by air), and covers hotel expenses, in the event of the latter being seriously ill. The annual premium is £3 15s and the company hope that in the near future a similar scheme will be made available for all ground and aircrew personnel in civil aviation.

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The United States Government has announced the partial cancellation of the Federal 15 per cent tax on overseas flights. The tax was a wartime measure imposed on all airline passenger fares purchased within the United States for domestic and international travel. Cancellation applies, for the present, only to

CIVIL AVIATION NEWS

passages outside the Western Hemisphere and to South America, and will remain for domestic flights within the U.S. and from the U.S. to Canada, Mexico and the West Indies.

NATIONAL GLIDING CLUB SCHEME

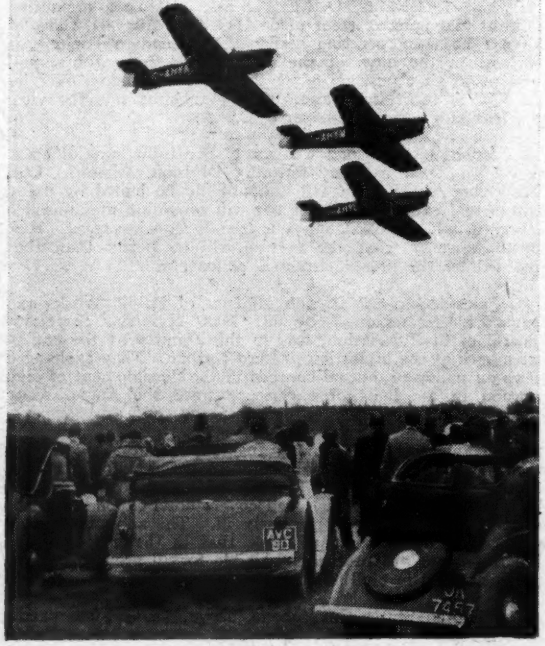
A SCHEME has been prepared by the council of the British Gliding Association for the development of gliding clubs on a national basis. It has been approved in principle by Lord Kemsley, whose fund will be distributed on loan to clubs throughout the country. Clubs are requested not to send details of their schemes or requests for assistance, but it has been suggested that all particulars of requirements are prepared in order to save time when they are called for. Lord Londonderry has consented to become president of the Association, and he has presented a silver cup for the annual competition between B.G.A. clubs. The date for the national contests will be between June 21st and 29th, and they will almost certainly be held at Bramcote airfield, near Nuneaton. This is, of course, subject to the satisfactory conclusion of negotiations with the Admiralty. This year's contests must be regarded primarily as a rehearsal for the 1948 international contests, not only with regard to flying according to the F.A.I. competition rules, but also as a test of the ground organization. There will be a senior class for gliders with a span of 15 metres or over, and a junior class for gliders with a span of less than 15 metres. At the close of the competitions about twenty pilots will be selected as possibles for the British team for the 1948 international contests. Qualifications for this year's competitions were to be a "C" gliding certificate, twenty-five hours' soaring, ten winch launches or auto-tows, and six aero-tows. It is expected, however, that some modification will be necessary, and the complete set of regulations will be issued as soon as possible. In the meantime applications for entry forms should be made as soon as possible to the secretary of the B.G.A., stating at the same time the number of aircraft, the total number of pilots and helpers in each aircraft team and their sexes, whether they can provide their own tug aircraft, and whether accommodation is required at Bramcote. Applications should reach the secretary at Londonderry House, 19, Park Lane, without further delay. British competitors will have to pay their own messing and accommodation expenses, but the association intend to invite as guests a few gliding pilots from each country likely to take part in the 1948 competitions. This will enable them to try out local conditions and test the new international contest rules. The expenses for the contests will naturally be heavy, and donations would be welcomed by the secretary of the B.G.A., also any gifts such as barographs, parachutes, instruments, wire or rubber launching ropes, aero-tow ropes, which would be suitable as club team prizes, and any gifts of a personal nature which would be suitable for individual prizes.

FROM THE CLUBS

WOLVERHAMPTON AERO CLUB announce that A. Cdre. John Oliver, A.F.C., has been elected president. This announcement coincides with club plans to extend activities, and a full-scale air display will take place at the airport on Saturday, May 10th. An attractive show is promised by the organizers.

* * *

THE three Hunting flying clubs have in the past been administered by Mr. P. Sentance from Luton, of which club he was also manager. Mr. J. F. Arnold, who was chief instructor there is the new manager and Mr. Sentance has moved into new offices alongside the management company of the Hunting Group. The Group, of course, own and operate Luton Flying Club and provide the flying facilities at Cinque Ports at Lympne, and at the Portsmouth Aero Club. They now have sixteen aircraft made up of two Percival Proctors, eleven Tiger Moths, two Austers and a Magister. Before the end of this month they are expecting delivery of a further three Austers and another Proctor.



QUITE TIGHT : The three Magisters belonging to Fairey's Flying Club formating over the spectators after the opening ceremony at White Waltham.

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THE Gloucester Flying Club informs us that several added facilities are now available during the hours of daylight at Staverton Aerodrome, home of the Gloucester club. These include overnight hangarage, minor servicing, 73-octane aviation spirit and various grades of aero oil. Manager of the club is G/C. L. Andrews.

* * *

WE hear of the formation of a new club in Leicester named the Allied Flying Services Flying Club. Membership is confined to members of the Leicester branch of the Royal Air Force Association. Sir Lindsay Everard has been elected president, with G/C. Charles Dalison as chairman, and Mr. K. Bowden, Hon. Secretary. The official opening ceremony is scheduled to take place during the summer.

* * *

THE Royal Artillery Aero Club is holding a week-end rally on June 14th and 15th. Members of British aero clubs, the British Gliding Association and private owners are invited. There are to be five powered-flying competitions and five gliding competitions. Anyone interested in receiving particulars should communicate with the Hon. Secretary, The R.A. Aero Club Rally, Air Wing, School of Artillery, Larkhill, Nr. Salisbury, Wilts. Telephone Bulford 3171, Ext. 547.

* * *

MEMBERSHIP of Cowes Aero Club is steadily showing an increase, and the club is planning a full-scale social programme including a Summer Air Display. The club fleet consists of three Austers, two Proctor Vs and one Moth Minor. During the last month bad weather hampered club activities, but the airport remained open and serviceable without a single day's exception. Twice recently club aircraft have been privileged to carry out "errands of mercy" in rushing urgent cases of illness to the mainland for special medical services. Cowes Aero Club offer a warm welcome to all flyers of other clubs who care to visit the island field.

* * *

THE Herts and Essex club held their first flying competition since the club restarted on Sunday, April 27th, at Broxbourne. To encourage all flying members to participate, the competition was divided into two sections, Senior and Junior. Ten Senior members competed for the "55 Squadron" Challenge Cup presented to the club by Mr. S. A. Perrin, and six Junior members for the "Margaret Blackshaw" Challenge Cup, presented to the club by Mr. J. Leslie Williams.

Flying ability tests were judged in the air by club instructor S. H. Parker, and included recovery from spins, short cross-country, forced landings and general flying and airmanship. Winners of the competition were: Senior, Mr. J. S. Wreford; Junior, Mrs. M. L. Green.

There was a good turn out of club members and other enthusiasts at Broxbourne, and it is to be hoped that this first post-war competition will be the start of many such events.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

DELIVERING THE GOODS

Making-up Seven Years' Leeway

WE thank you for the comment which you have appended to the letter from Mr. Powell in your issue of May 1st (page 404), but would like to offer a thought in reply to Mr. Powell's remark about the de Havilland Engine Company being unable to "deliver the goods."

For anyone far from Europe it is perhaps difficult to appreciate the leeway in production that has to be made up as the result of the war. Even if we could build engines at five times the present rate we still could not satisfy all demands. The same applies to houses, food and clothing, indeed to every commodity. To suggest that the manufacturer is blameworthy for being unable to replace in a couple of years, and in the conditions prevailing, the shortages caused by seven years of destructive effort is not only unjust but unhelpful, at a time when constructive endeavour and encouragement are needed here. MARTIN SHARP.

Public Relations Officer, de Havilland Enterprise.

CONTRA-ROTATING AIRSCREWS

Why Not a Differential Reduction Gear ?

A STATEMENT in the book *Gas Turbines and Jet Propulsion For Aircraft*, that the most efficient combination of contra-rotating airscrews is that in which each half is absorbing equal torque, prompts me to raise a question which has baffled me since the introduction of these airscrews.

Why is it customary for each half of the airscrew to be independently driven from the crankshaft ? Such a system would appear to be almost as unsatisfactory as a solid rear axle on a car. Surely it would be more logical to employ a differential reduction gear which would ensure an equal distribution of torque between the two halves. This could be achieved as simply as the present arrangement—at any rate with the epicyclic type of reduction gearing likely to become universal with the advent of the gas turbine.

Whilst the pitch-changing mechanism of contra-rotating airscrews continued to be actuated by a C.S.U. and servo-unit common to both halves it would, of course, still be necessary to provide a coarser basic pitch setting for the rear half in order to restrain its r.p.m. to those of the front half and ensure an equal power absorption by the two halves. Other factors being constant, the aerodynamic efficiency of the airscrew as a whole depends on the maintenance of this equal power absorption by the two halves, and, therefore, it would be desirable to determine the degree of pitch "advance" required by the rear half under cruising conditions, where maximum overall efficiency is required in the interests of fuel economy and maximum range. G. N. J. ROBINSON.

HIGH-SPEED MAILPLANES

Pander "Postjager" Recalled

IN *Flight* of April 24th in American Newsletter "Kibitzer" asks why nobody has yet considered a high-speed mail-carrying aircraft. Well, somebody did not only consider it, but he built it as well. In 1934 the Dutch designer Slot, then chief designer to Pander, built his S4, a three-engined, low-wing monoplane, the engines being Wright Whirlwinds of 420 h.p. At that time the speed of this plane was about 100 km/h higher than that of other types in use. Only one S4 was built. It made a trip to the Dutch East Indies and was named *Postjager*. On the outward-bound journey it did have quite a lot of trouble, mainly with the engines. So the trip took much longer than was expected, and the mail was transferred to the K.L.M. machine *Pelikaan*, a Fokker F18, which made a special Christmas tour to Batavia in less than five days.

It was hoped to institute a special mail service to Dutch East Indies, but K.L.M. was not interested in it, because they thought the passenger/mail service was fast enough and the difference in time did not outweigh the extra cost.

In 1935 the same machine, re-named *Panderjager*, was entered in the Melbourne race. As on her first journey she remained unlucky. Engine trouble developed again and after repairs she took off, but just after becoming airborne one engine caught fire and the plane was burned completely. If I remember right, this happened in Baghdad.

Pander, in fact a furniture maker, stopped his aircraft department and Slot, with his staff, joined "De Schelde" shipbuilding yard in Vlissingen (Flushing).

Here Slot designed a development of the S4, again a three-engine monoplane, midwing this time, with a small passenger accommodation of four, if my memory serves me right. This machine was never built, however. R. MULDERS.

AIR CARRIAGE OF FREIGHT

Its Defence Implications

THE frequent references in your esteemed journal to the ever-growing importance of the carriage of freight by air prompt a few thoughts on an aspect of the subject which I have not so far seen mentioned—the defence implication. Perhaps you will bear with a note on the subject.

In 1890 the American historian, Mahan, in his study, "The Influence of Sea Power on History," argued that sea power exerted such overwhelming pressure that the belligerent who did not possess it was doomed to defeat. He then went on to say that the right way of using sea power was to destroy the enemy's organized naval forces. This point of view has since won universal acceptance, and its correctness has been demonstrated in two world wars. Further, the recent war has shown that the same truth applies to air warfare and that the first object of a belligerent must be, in the air, to destroy the enemy's organized air forces. It is, therefore, worth while to consider whether the principles enunciated by Mahan in his introductory chapter to define the origins of naval strength do not apply also to air strength.

These principles are six in number and would demand a lengthy paper to examine in detail, but there is one that concerns us here. The strength of a navy derives from the aptitude of a people to the sea as shown in its mercantile marine. No nation can have a strong navy if this is not backed by the resources in shipbuilding and in sea-trained personnel of a flourishing seaborne trade. Where these exist there is no difficulty in building up organized naval forces. Without them, as Colbert found, strong navies cannot be maintained.

Surely the same arguments apply to the air. Twice in the last thirty years we have been almost defeated by blockade. The second time our defeat by blockade could have been completed and finalised by the correct use of air power. Yet the adequate use and development of the carrying power of aircraft could at the same time largely have thwarted the effects of the sea blockade. If war comes again we shall have to deal with the effects of blockade by both sea and air.

We should then develop to the utmost of our capacity the carriage of freight by air, first and foremost so that we have at our disposal the building resources of large-scale aircraft factories together with the constant technical development of men and machines that a flourishing industry brings with it, and secondly so that we may have available at need the carrying resources for goods that sea blockade may make a matter of life and death. J. C. CORBY.

SERVICE AVIATION

SPECIALIST : Designed specifically as a carrier-borne torpedo-bomber and possessing all design features essential in an aircraft of this class, the new Blackburn S. 28/43 (Y.A.1.) is now undergoing initial flight trials at Brough.

King Christian's Funeral

THE Air Council and the Royal Air Force were represented at the funeral of the late King Christian of Denmark by A.V-M. R. A. George, C.B.E., M.C., the Air Attaché in Paris.

The King's Flight

THE four Vickers Vikings of the King's Flight have completed more than 160,000 miles flying without incident. Three of them lately returned to R.A.F. Station Benson, the King's machine having covered 7,500 miles in 54 hr. Leaving Capetown at 12.30 a.m. on Friday, April 25th, it reached Benson at 6.32 a.m. on the following Sunday, and at 7.51 a.m. the next day took off again for South Africa. It was to be present at an air display in Johannesburg on May 3rd and was scheduled to fly 15,000 miles in five days.

The Queen's aircraft (VL247) left Capetown at 6 a.m. on Friday and landed at Benson at 1.30 p.m. on Monday; and the staff aircraft (VL245) left Capetown at the same time and landed at Benson at 1.54 p.m. on Monday. VL245 left Benson again for Capetown at 9 a.m. on Tuesday, and VL247 at 8 a.m. on Wednesday.

The five flights of the Royal Family were from Bloemfontein to Bultfontein (30 min), and return; from Pretoria to Pietersburg (1 hr 20 min) and return; and from Pretoria to Salisbury (2 hr 50 min). The King and Princess Margaret travelled in the King's aircraft, and the Queen and Princess Elizabeth in the Queen's. The two Princesses were taken for a 1¼ hr flight over the Cape Peninsula in the King's aircraft from Brooklyn Airport, Capetown. In addition, General Smuts was flown twice—once from Capetown to Pretoria, and Sir Evelyn Baring, the High Commissioner to South Africa, on three occasions.

Royal Air Force and Naval Aviation News and Announcements

Throughout the whole of the tour the Flight ran smoothly, and the only thing approaching an "incident" was when the King was being flown near Pietersburg and the Viking collided with a snake bird. The nose of the aircraft was dented.

Lincolns for Canada

NO. 617 Squadron of Bomber Command, equipped with Lincolns, will make a formation training flight to Canada and the U.S.A. during July.

C.A.S.'s Exercise "Thunderbolt"

THE Chief of the Air Staff, Marshal of the R.A.F. Lord Tedder, is to hold a conference with Commanders-in-Chief of the Royal Air Force at Old Sarum on 11th and 12th August, 1947, at which matters of domestic concern to the Royal Air Force will be discussed. An exercise will follow, to which senior officers of the R.A.F. and other Services and of the Dominions Air Forces, and officials of the Ministry of Defence will be invited.

The object of the C.A.S.'s Exercise—"Thunderbolt," as it is called—is to study the strategy and conduct of the combined bomber offensive from January, 1943, to the end of the European War, with special reference to the situation in the Spring of 1944; and to deduce lessons from this campaign which can be applied to future strategy.

Recent scientific advances will affect air warfare as well as land and sea warfare, but since the implications of new weapons cannot yet be fully appreciated, this first post-war R.A.F. exercise is limited, except for a brief period towards the end, to the study of weapons as we know them today. Some of the lessons which emerge may well be subject to modification in the light of new developments; these aspects will be studied in future exercises.

The Exercise will begin with a review of the enemy situation and our own at the beginning of 1943 and a joint planning conference will be simulated to bring out the various factors which led to the formulation, at the Casablanca Conference, of the directive which governed the operation of the combined British and United States strategic bomber forces until the end of the war.

Lectures and discussions will show how target systems were selected and how they were dealt with; how the offensive led to the smashing of the power of the German Air Force and the consequent ascending scale of our air superiority; the switching of the effort from Germany on to invasion tasks from March, 1944, to September, 1944; and the swinging back of the bombers on to Germany from September, 1944, for the final decisive destruction of the enemy's oil and communications.

During the Exereise a meeting of the Combined Strategic Targets Committee will be simulated.

Reunion

PAST and present members of 612 Squadron (all ranks) interested in a proposed reunion should write to S/L. W. A. Cormack, R.A.F., Marham, Norfolk.

Lincoln for Empire Radio School

A NEW aircraft—a Mark II Lincoln, bearing the name *Mercury II*—will be used by the Empire Radio School, Debden, on its next liaison mission, this time to Canada and the U.S.A. The Lincoln will supersede the Halifax VI named *Mercury*, in which its two pre-

SERVICE AVIATION

vious missions were flown. The aircraft will leave the United Kingdom on May 27th and will visit R.C.A.F. establishments and the U.S. Army Air Force before returning to this country on July 2nd.

U.-S. of S. on Recruiting

OPENING the R.A.F. Mobile Exhibition at Marylebone Station on April 25th, Mr. Geoffrey de Freitas, M.P., Under-Secretary of State for Air, said:—

"Recruiting for the R.A.F. to-day is better than it has ever been before. That is not a hope, that is a fact. We have set a high standard for regulars, and we are going to keep to it. We won't take anybody and everybody. But there is room for keen young men who are not afraid of having to do a real job. There is room for both the skilled and the unskilled.

"These exhibitions, which will travel by road and rail throughout the Kingdom, will show something of the jobs to be done in the R.A.F., of the good life in the R.A.F., and of the possibility of carrying on in civil life with a trade learned in the Service. In these exhibitions there are machines which answer questions about the R.A.F. If we can get coupons for a dark suit to fit one of these machines we shall try it out in the House of Commons at question time."

The U.-S. of S. spoke again, in the following terms, at the annual dinner of the new Edgware Branch of the British Legion on April 26th:—

"The Royal Air Force is a young Service and relies principally on young men. But we have room for the over-40's. We have changed our Bounty regulations so that we can benefit from the experience of those who are beginning to be a little thin on top.

"There is a big difference from the pre-war R.A.F. We now fight on the ground as well as in the air, and to train the men of the R.A.F. Regiment we need instructors who have served in our great sister Services—in the Royal Marines or in the Army."

36 HOURS AFLOAT: An R.A.F. airborne rescue launch was lately dropped into the Channel from a Lancaster of No. 203 Squadron, St. Eval. The crew remained aboard until they were towed into Fowey 36 hours later. Seen in their craft, left to right, are F/L. K. E. Paine; F/Sgt. D. R. Benfield; F/L. C. J. Frith; and W/C. T. Q. Horner.

A.T.C. Explorers

SPECIALLY chosen for their outstanding character and spirit of adventure, seven A.T.C. cadets aged between 17 and 19 will accompany the Public Schools Exploring Society's expedition to Newfoundland this summer. The party will be led by Surgeon Commander G. Murray Levick, R.N., a member of Capt. Scott's Antarctic expedition. The scientific objects of the expedition include mapping and survey, short-wave wireless experiments, collection of scientific specimens, and the study of birds, mammals, insects, plants and minerals for the British Museum.

NAVAL AIRWOMEN: Admiral Sir Thomas Troubridge, Flag Officer (Air) (Home) addresses old and new recruits for the new W.R.N.S. category of Naval Airwoman. They will be employed on maintenance at stations in Britain, and are at present undergoing training at Evanton, near Inverness.

New Survey Technique

AFTER trials over small areas in the United Kingdom and successful employment in West Africa last year, the R.A.F. has adopted a new aerial survey technique, employing radar control of the photographic aircraft. The lessons learnt in West Africa will be applied to a survey shortly to be made in East Africa. This will include areas of importance to the Colonial Governments concerned and at the request of the Ministry of Food, a region to be used for the groundnuts scheme.

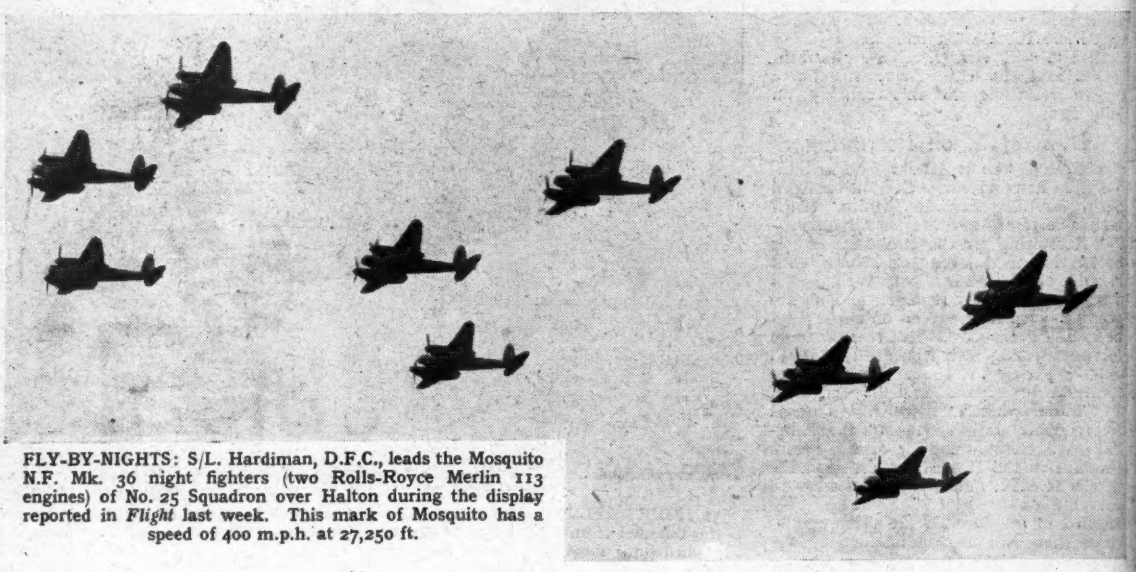
Nearly the whole area flooded by the Thames, Great Ouse, Yorkshire Ouse and Medway has been photographed by the R.A.F., and some units, on behalf of the Ministry of Works, have been instructed during the course of their training to photograph a number of ancient monuments, castles and Roman camps.

Last year the Service photographed 380,000 sq miles in the British Isles, Europe, the Middle East, India, the Far East and West Africa.

Meteor Facts

THE latest specification of the Gloster Meteor IV fighter issued by the manufacturers mentions a number of points which are either new or have not hitherto been generally appreciated. For example, in addition to the 325-gallon dual-cell internal tank and the 180-gallon fuselage drop tank, there is provision for two 100-gallon wing tanks. Supple-

SERVICE AVIATION



FLY-BY-NIGHTS: S/L. Hardiman, D.F.C., leads the Mosquito N.F. Mk. 36 night fighters (two Rolls-Royce Merlin 113 engines) of No. 25 Squadron over Halton during the display reported in *Flight* last week. This mark of Mosquito has a speed of 400 m.p.h. at 27,250 ft.

menting the four 20-mm guns and as an alternative load to two 1,000 lb bombs, the Meteor will carry eight 90lb rocket projectiles.

Flying at an all-up weight of 15,000 lb and with the Rolls-Royce Derwent Vs running at combat rating, the Meteor attains 585 m.p.h. at sea level and at 10,000 ft, 570 m.p.h. at 20,000 ft, and 540 m.p.h. at 30,000 ft, the two last figures applying to Mach number limitation of 0.8. The maximum rate of climb is 7,500 ft/min at sea level; at 20,000 ft it is 4,750 ft/min, and at 40,000 ft 1,650 ft/min. A height of 20,000 ft is attained in 3.3 min, and the height at which the rate of climb has dropped to 500 ft/min is 46,500 ft.

With its internal tankage alone the Meteor IV has a range at 30,000 ft of 420 miles, corresponding to an endurance of 1.3 hr. The addition of the 180-gallon drop tank increases the range and endurance at the same height to 680 miles and 2.1 hr. With the extra 100-gallon drop tanks the corresponding figures are 1,000 miles and 2.8 hr.

The reduction of the Meteor's span resulted in an improvement in rate of roll. At an indicated air speed of 350 m.p.h. this is 100 deg/sec, at 400 m.p.h. 90 deg/sec, and at 500 m.p.h. 50 deg/sec.

Considering a bombing dive approach at 400 m.p.h. at sea level, the air brakes have the following effect on angle of descent: with engines idling the dive angle for the clean aircraft is 10 deg, and with brakes open, 35 deg. With the turbine jets running at cruising r.p.m. the clean aircraft is climbing, and with brakes open, is diving at 15 deg. The Meteor can be dived from 30,000 ft to sea level with the brakes open and engines at cruising r.p.m. in less than 1½ min without exceeding the design requirements of speed or Mach number.

The landing speed is quoted as 125 m.p.h. and the stalling speed, with flaps and undercarriage down, as 105 m.p.h.

The Meteor IV is cleared for a gross weight of 18,000 lb.

Bombs v. Concrete

IN *Flight* of May 30, 1946, an account was given of the bombing trials against the German U-boat assembly centre at Farge, north-west of Bremen on the River Weser. Some details are now available of the results of these tests, which were made by Lancasters of No. 15 Squadron and Superfortresses and Fortresses of the U.S.A.A.F. Out of a total of 272 bombs dropped on the Farge target and on a second target on Heligoland, 123 hits were registered in 23 separate tests, during which the bombing height was varied. The U.S.A.A.F. put up a very creditable performance in scoring three hits with three 22,000 lb bombs released from 17,500 ft; No. 15 Squadron obtained four hits with five 12,000-pounders from 20,000 ft. One American bombardier registered an error of less than 20 yd with a 4,500 lb rocket-assisted bomb from 20,000 ft.

The trials revealed the accuracy which can be expected from experienced crews, the effect of weather, and an indication of the frequency with which pin-point targets can be attacked in daylight from high altitude, using visual sighting.

An interesting point is that the use of open bomb bays, as on the "Grand Slam" Lancaster, proved unacceptable, owing to ice accretion on the bombs and the freezing of release slips. The need for fully retracting bomb doors to prevent "hunting" during the bombing run was also demonstrated, and it was further shown that greater accuracy is obtainable with an electronic automatic pilot linked to the bomb sight.

A.T.C. Boxing

THE finals of the A.T.C. National Boxing Championships, held at the Royal Albert Hall on Monday, April 28th, provided grand entertainment. The first event of the evening was a bout in the Junior class at the midget weight of 7 st for the *Flight* Cup. This resulted in a win for D. Lloyd, No. 1533 (Colwyn Bay) Sqn., mainly because of his advantage, both in height and reach, over his rival. As a famous radio sports commentator once remarked, "A good big 'un will always beat a good little 'un," all other things being equal. The Cup was presented by Air Marshal Sir Leslie Hollinghurst.

The two Junior bouts at 10 st and 10 st 7 lb were lightning affairs. Cpl. Armstrong, No. 49 (F. Greenock) Sqn., won the "Chamier" Cup in half a minute by a technical K.O., and R. King, No. 1061 (Southwark) Sqn., the "Bailey" Cup, in three-quarters of a minute. The remainder of the Junior events were studies in endurance, speaking well for the physical fitness of the A.T.C.

In the Senior class the best bout of the evening was that fought for the "Arthur Mach" Cup, at 11 st 6 lb. This was won by Cadet Tedd, of No. 496 (Solihull) Sqn., in an extremely close contest. The cheers heard later, when it was announced that F. Woollard, No. 23 (F. Bushey) Sqn., his opponent, had been awarded the "Roy Limbert" Cup for the best loser of the finals, were equal in volume to those for the winner.

Cadet Cooper, No. 1459 (S. England) Sqn. won both the "Hilary" Cup and the A. J. Elvin Cup, awarded for the best performance in the finals. He began in a cool manner, boxing cleverly and hitting vigorously when openings occurred. He won on a technical K.O. in the second round.

Seventeen bouts in all were fought—nine Junior, eight Senior class, six won by technical K.O.s and 11 by decisions. All were fought under A.B.A. rules. No. 63 (Western) Group won the Harewood Trophy for the greatest number of points in the finals, wresting it from the previous holders, N.W. Command. The Star Silver Wings Trophy and the Northern Wings, awarded for the greatest number of finalists in the South and North respectively, were retained by No. 1061 (Southwark) Sqn. and No. 2093 (Manchester) Sqn.